

COASTAL ENVIRONMENTAL ANALYSTS

15 January 2008

Mr. Carl Goldstein Pacific Insular Area Programs CMD-1 Environmental Protection Agency 75 Hawthorne Street San Francisco, CA 94105 Mr. Peter Peshut American Samoa Environmental Protection Agency American Samoa Government P.O. Box 368A Pago Pago, American Samoa 96799

RE: Effluent Metals Testing – StarKist Samoa September 2007 Sampling

Enclosed are two copies of the report with the results of the effluent metals testing for StarKist Samoa, September 2007 sampling. The sampling and analysis were carried out without problems. The results are similar to the past effluent metals test results.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Karen a. Hletzel

Encl: Effluent Metals Testing - StarKist Samoa September 2007 Sampling

Cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte; Rob Darby (with one copy of enclosure)

EFFLUENT METALS TESTING — STARKIST SAMOA SEPTEMBER 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

gdc, P.O. Box 1238, Trinidad, CA 95570 707-677-0123 – gdcocn@earthlink.net

Date: 21 December 2007

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 tradewind season was done using eight (8) samples. A sample was collected every three hours for a 24 hr period September 4th and 5th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		3.69	1.01	3.87

Copper was below the American Samoa Water Quality Standards criterion for all samples, except one, where it is equal to the standard. Mercury exceeded the ASWQS criterion for four of the eight samples, and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In September 2007 metals analyses were conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and, after high strength waste segregation, the treated process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted zone of mixing (ZOM) for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined effluent discharge. Each effluent grab sample was analyzed for mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly, SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 4 September and 06:00 on 5 September 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. A total of eight grab samples were collected. A 1-gallon plastic cubitainer was filled at each sampling interval. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Table 1. Res	ults of Effluen	t Metals Testi	ng – Septembe	er 2007
Time	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
4 Sept 2007 - 09:00	1.17	0.0614	2.90	290
4 Sept 2007 - 12:00	1.33	0.0168	3.13	298
4 Sept 2007 - 15:00	1.39	0.0152	1.91	227
4 Sept 2007 - 18:00	1.28	0.0490	0.89	107
4 Sept 2007 - 21:00	1.22	0.0630	1.94	232
5 Sept 2007 - 00:00	1.28	0.0502	0.94	130
5 Sept 2007 - 03:00	1.17	0.0866	1.54	135
5 Sept 2007 - 06:00	1.27	0.1220	1.63	132
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Standard Deviation	0.076	0.0351	0.81	77.0

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS September 2007 samples (0.0580 $\mu g/l$; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 $\mu g/l$) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was noticeable, but relatively low, variability among the results from individual grab samples (standard deviation = $0.035 \,\mu\text{g/l}$) as shown in Table 1.
- Four of the eight of the samples were above the recently revised ASWQS water quality standard criteria of $0.05~\mu g/l$. One sample was equal to the criterion. The current NPDES Permit does <u>not</u> have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS September 2007 samples was $1.86 \,\mu g/l$ (Table 1). The average concentrations reported for this sampling period are generally less than those reported for previous analyses as described in the next section, and similar to the value reported in February 2007.
- There was noticeable, but relatively low, variability among the copper results from the eight individual grab samples with a standard deviation of $0.81 \,\mu\text{g/l}$.

³ Conducted in September 2004.

- All of the samples had copper concentrations below or equal to the ASWQS criterion⁴ of 3.1 μ g/l (one sample was essentially the same as the criterion). The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μ g/l, and daily maximum of 108 μ g/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

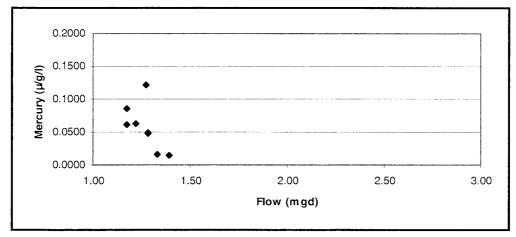


Figure 1. SKS effluent flow rate and mercury concentration (Sept 2007)

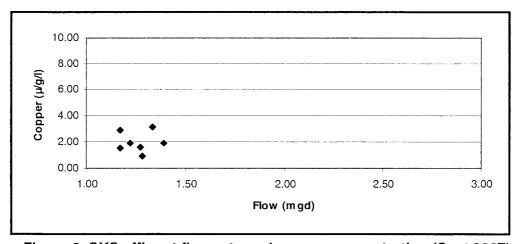


Figure 2. SKS effluent flow rate and copper concentration (Sept 2007)

The results of the sample testing for zinc indicate:

• The average zinc concentration for the SKS September 2007 samples was 194 μ g/l (Table 1). This concentration is less than the average values for previous analyses described in the next section and about the same as the result for the February 2007 sampling.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 77.0) with a range between 107 μ g/l and 298 μ g/l (Table1).
- All eight zinc samples were above the ASWQS criteria of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

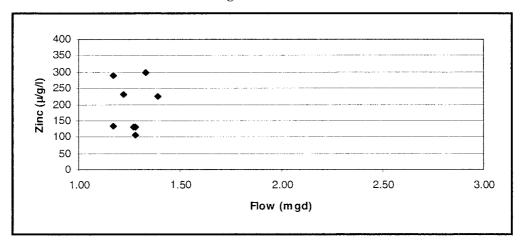


Figure 3. SKS effluent flow rate and zinc concentration (Sept 2007)

Comparison to Previous Tests

A summary of the semi-annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution (ZID). The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

 D_R = is the dilution required to reduce the concentration to the ASWQS

 C_E = the effluent concentration

 C_A = the maximum receiving water concentration

 C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

	Table 2. Summary of Effluent Metals Testing Results and Dilution Required* to Meet ASWQS Criteria											
Parame			cury		pper		inc					
Water Quality			i μ g/l		μ g/l	81	μ g/l					
Ambient Ma			32 μg/l		μ g/l		μ g/l					
Sample	Flow	Conc.	Dilution	Conc.	Dilution	Conc.	Dilution					
Date	(mgd)	(μ g/l)	Required	(μ g/l)	Required	(μ g/l)	Required					
Dute	2.44	0.0734	1.87	(49/-/	110441104	(49,-7	11.09					
	3.05	0.109	3.20		-		 					
	3.02	0.101	2.90		 							
	2.39	0.122	3.69		 		-					
Aug 2005	2.55	0.177	5.74		+							
	2.8	0.153	4.84									
	2.03	0.112	3.31	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	—							
	2.14	0.0912	2.54		-							
	1.98	0.107	3.13	3.63	1.23	264	3.42					
	2.63	0.083	2.23	2.82	1	196	2.52					
	2.6	0.298	10.25	2.17	1 1	146	1.86					
	1.94	0.088	2.42	3.61	1.22	226	2.92					
Feb 2006	1.95	0.096	2.72	3.67	1.25	340	4.43					
	2.16	0.092	2.57	2.44	1	267	3.46					
	2.53	0.102	2.94	1.79	 	190	2.44					
	2.15	0.102	4.54	4.83	1.76	266	3.45					
	2.13	0.0802	2.13	2.92	1 1	200	2.58					
	2.12	0.0820	2.19	3.93	1.37	272	3.53					
	2.12	0.0820	4.73	4.32	1.54	368	4.80					
	2.76	0.140	4.73	3.3	1.09	. 322	4.19					
Nov 2006	2.70	0.106	3.09	3.14	1.02	329	4.28					
	2.40	0.104	3.09	2.79	1.02	246	3.19					
	2.41	0.158	5.03	3.35	1.11	278	3.61					
	2.60	0.115	3.43	2.28	1 1	195	2.51					
	2.20	0.0550	1.19	1.56	1	169	2.17					
	2.20	0.0586	1.32	2.31	 	296	3.85					
	2.02	0.0566	1.66	2.02	 	178	2.28					
	2.50	0.0501	1.00	1.43	<u> </u>	142	1.81					
Feb 2007	2.48	0.0704	1.76	2.16	 	196	2.52					
	1.76	0.0704	1.70	1.81	1 1	166	2.13					
	2.16	0.0427	2.21	2.98		222	2.87					
	2.15	0.0810	2.16	2.13	 	159	2.03					
	1.17	0.0614	1.43	2.13	1 1	290	3.77					
	1.33	0.0614	1.43	3.13	1.01	298	3.87					
	1.39	0.0152	1	1.91	1 1	227	2.93					
	1.28	0.0152	1	0.89	1 1	107	1.34					
Sep 2007		0.0490		1.94	1	232	3.00					
	1.22		1.49	0.94	1	130	1.65					
	1.28	0.0502		1.54	1 1	135	1.72					
	1.17	0.0866	2.37		1	132	1.68					
	1.27	0.1220	3.69	1.63		and the same in the same of th						
Minimum	1.17	0.0152	1.00	0.89	1.00	107	1.34					
Average	2.12	0.0964	2.80	2.57	1.08	225	2.90					
Maximum	3.05	0.2980	10.25	4.83	1.76 required is shown	368	4.80					

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:16. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **9dc**, 28 June 2007

ATTACHMENT I

Chain-of-Custody

CHAIN OF CUSTODY

10208430

													0010
PROJECT:	StarKist Efflu	ent Mon	itoring - Sk	(S0702.TW									
FROM:	Karen Glatze	el, gdc											
	P.O. Box 123	38, Trinic	dad, CA, 95	5570-1238				707-677-012	3	gdcoc	n@ea	thlink.	net
TO:	Harvey Jack				**************************************								
								360-577-722	2			*****	
	1317 South	I 3th Ave	, Keiso, VV.				ΛΝΛΙ	YSIS REQUES					T
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF	~ 5	1 11110 11	, ,,				7-	11-	COMMENTS
				CONTAINERS	Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chiorophyli-a	Cu	Zn	Hg	
SKS-1	9/5/2007		Water	2		ļ	.			X	X	X	1
SKS-2	9/5/2007		Water	2						X	X	X	1
SKS-3	9/5/2007		Water	2			<u> </u>			X	X	X	1
SKS-4	9/5/2007		Water	2						X	X	X	Total metals
SKS-5	9/5/2007		Water	2						X	X	X	1
SKS-6	9/5/2007		Water	2						X	X	X	1
SKS-7	9/5/2007		Water	2						X	X	X	1
SKS-8	9/5/2007		Water	2						X	X	X	ļ
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SAMPLED BY			MA	DATE/TIME:		2007							
SHIPPED VIA							Note: Sample may be as much as 40% seawater						
	SHED BY: S.Costa DATE/TIME: 9/6/2007					Heport Du	p, MS, MSD as	requirea					
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Country USA	I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or advanage to U.S. \$100. The Warsaw Covention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment	PICKED UP BY
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98626 360-577-7222	Signature (required) Date / /	Time Date

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

Glatzel da Costa, gdc

Service Request No.:

K0708430

Project:

Starkist Effluent Monitoring / SKS0702.TW

Date Received: 09/18/07

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 09/18/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

pproved by	# Date	10/3/107
**		

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y
 The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Metals

- 1 -INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received:

9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-1

Lab Code:

K0708430-001

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	2.90		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	290		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix: WATER

Units: ug/L

Basis: N/A

Sample Name: SKS-2 **Lab Code:** K0708430-002

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	3.13		
Zinc	200.8	21.7	1.74	20.0	10/02/07	10/04/07	298		

% Solids: 0.0

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Ser

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Units: ug/L
Basis: N/A

Sample Name:

Matrix:

SKS-3

WATER

Lab Code:

K0708430-003

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	1.91		
Zinc	200.8	21.5	1.72	20.0	10/02/07	10/04/07	227		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix: WATER

Units: ug/L

Basis: N/A

Sample Name: SKS-4

Lab Code: K0708430-004

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	0.89		
Zinc	200.8	1.06	0.09	1.0	10/02/07	10/04/07	107		

% Solids: 0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

9/18/07 Date Received:

Matrix:

WATER

Units: ug/L

N/A Basis:

Sample Name:

SKS-5

Lab Code:

K0708430-005

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.94		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	232		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Matrix:

Date Received: 9/18/07

WATER

Units: ug/L Basis: N/A

Sample Name:

SKS-6

0.0

Lab Code:

K0708430-006

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	0.94		
Zinc	200.8	1.08	0.09	1.0	10/02/07	10/04/07	130		

% Solids:

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-7

Lab Code:

K0708430-007

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.06	1.0	10/02/07	10/04/07	1.54		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	135		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-8

Lab Code:

K0708430-008

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.63		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	132		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

Method Blank

Lab Code: K0708430-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.10	0.03	1.0	10/02/07	10/04/07	0.03	U	
Zinc	200.8	0.50	0.04	1.0	10/02/07	10/04/07	0.04	U	

% Solids:

0.0

Metals

- 3 -

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

	Initial Calib. Blank			Continuing Calibration Blank (ug/L)						
Analyte	(ug/L)	С	1	С	2	С	3	С	Method	
Copper	0.30	U	0.30	U	0.30	U	0.30	U	200.8	
Zinc	0.4	U	0.4	U	0.4	U	0.4	U	200.8	

Metals

-3-

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

	Initial Calib. Blank								
Analyte	(ug/L)	С	1	С	2	С	3	С	Method
Copper			0.30	U	0.30	U	0.30	U	200.8
Zinc			0.4	U	0.4	Ū	0.4	U	200.8

Metals

-3-

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Initial Calib. Blank									
Analyte	(ug/L)	С	1	С	2	С	3	С	Method
Copper			0.39	В	0.30	υ			200.8
Zinc			1.1	В	0.4	U			200.8

Metals

- 6 -

DUPLICATES

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Units: UG/L

Project Name: Starkist Effluent Monitoring

Basis:

N/A

Matrix:

WATER

% Solids:

0.0

Sample Name:

DLCSW K0708475

Lab Code:

LCSWD

Analyte	Control Limit	Sample (S)	С	Duplicate (D)	С	RPD	Q	Method
Copper		1.98		1.97		0.5		200.8
Zinc		2.10		2.36		11.7		200.8

Metals

- 10 -

DETECTION LIMITS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #:

K-ICP-MS-03

GFAA ID #:

AA ID #:

Analyte	Isotope	Back- ground	MRL ug/L	MDL ug/L	м
Copper	65		1.00	0.3	MS
Zinc	66		5.0	0.4	MS

Comments:	
	

Analytical Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0702.TW

Sample Matrix:

Water

Service Request: K0708430

Date Collected: 09/05/07

Date Received: 09/18/07

Mercury, Total

Prep Method:

METHOD

Analysis Method: 1631E

Units: ng/L Basis: NA

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0708430-001	5.0	0.25	5	09/18/07	09/26/07	61.4	
SKS-2	K0708430-002	1.0	0.05	1	09/18/07	09/26/07	16.8	
SKS-3	K0708430-003	1.0	0.05	1	09/18/07	09/26/07	15.2	
SKS-4	K0708430-004	1.0	0.05	l	09/18/07	09/26/07	49.0	
SKS-5	K0708430-005	1.0	0.05	1	09/18/07	09/26/07	63.0	
SKS-6	K0708430-006	1.0	0.05	1	09/18/07	09/26/07	50.2	
SKS-7	K0708430-007	1.0	0.05	1	09/18/07	09/26/07	86.6	
SKS-8	K0708430-008	1.0	0.05	1	09/18/07	09/26/07	122	
Method Blank 1	K0708430-MB1	1.0	0.05	1	09/17/07	09/26/07	0.3	В
Method Blank 2	K0708430-MB2	1.0	0.05	1	09/17/07	09/26/07	ND	
Method Blank 3	K0708430-MB3	1.0	0.05	1	09/17/07	09/26/07	ND	

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project:

Sample Matrix:

Starkist Effluent Monitoring/SKS0702.TW Water

Date Collected: 09/05/07

Date Extracted: 09/18/07

Date Received: 09/18/07

Date Analyzed: 09/26/07

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

SKS-4

Units: ng/L

Lab Code:

K0708430-004S,

K0708430-004SD

Basis: NA

Test Notes:

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL	Spike MS	Level DMS	Sample Result	Spike MS	Result DMS	MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	1.0	25	25	49.0	67.7	71.2	75	89	71-125	5	

QA/QC Report

Client:

Glatzel da Costa, gdc

Water

Service Request: K0708430

Project:

Starkist Effluent Monitoring/SKS0702.TW

Date Collected: NA

LCS Matrix:

Date Received: NA

Date Extracted: 09/18/07

Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Analysis Percent Acceptance Result Prep True Notes Analyte Method Result Recovery Limits Method Value Мегсигу METHOD 1631E 5.00 4.60 92 77-123

QA/QC Report

Client:

LCS Matrix:

Glatzel da Costa, gdc

Service Request: K0708430

Project:

Starkist Effluent Monitoring/SKS0702.TW

Water

Date Collected: NA

Date Received: NA

Date Extracted: 09/18/07 Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.46	89	77-123	

K0708430icp.dj.I - OPR (lcsw) (2) 9/27/2007

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project:

Starkist Effluent Monitoring/SKS0702.TW LCS Matrix: Water

Date Collected: NA Date Received: NA

Date Extracted: 09/18/07

Date Analyzed: 09/26/07

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Basis: NA

Test Notes:

CAS

Percent

Recovery Acceptance Result Prep Analysis True Percent Limits Notes Analyte Method Method Value Result Recovery METHOD 1631E 5.00 4.34 87 77-123 Mercury



COASTAL ENVIRONMENTAL ANALYSTS

28 July 2007

Mr. Carl Goldstein Pacific Insular Area Programs CMD-1 Environmental Protection Agency 75 Hawthorne Street San Francisco, CA 94105 Mr. Peter Peshut American Samoa Environmental Protection Agency American Samoa Government P.O. Box 368A Pago Pago, American Samoa 96799

RE: Effluent Metals Testing - StarKist Samoa February 2007 Sampling

Enclosed is one report concerning the effluent metals testing for StarKist Samoa, February 2007 sampling. The sampling and analysis were carried out without problems. The results are similar to the past effluent metals test results.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Kan a. Dlatel

Cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte; Rob Darby, CH2M HILL

Encl: Effluent Metals Testing – StarKist Samoa Feb 2007 Sampling

EFFLUENT METALS TESTING – STARKIST SAMOA FEBRUARY 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

gdc, P.O. Box 1238, Trinidad, CA 95570 707-677-0123 – gdcocn@earthlink.net

Date: 27 July 2007

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 non-tradewind season was done using eight (8) samples collected every three hours on February 27th and 28th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		2.2		3.9

Copper was below the American Samoa Water Quality Standards criterion for all samples. Mercury exceeded the ASWQS criterion for 7 of the eight samples and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In February 2007 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted ZOM for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 27 February and 06:00 on 28 February 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Tab	ole 1. Results	of Effluent Me	tals Testing	
Time	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
27 Feb 2007 - 09:00	2.20	0.0550	1.56	169
27 Feb 2007 - 12:00	2.02	0.0586	2.31	296
27 Feb 2007 - 15:00	2.06	0.0676	2.02	178
27 Feb 2007 - 18:00	2.50	0.0501	1.43	142
27 Feb 2007 - 21:00	2.48	0.0704	2.16	196
28 Feb 2007 - 00:00	1.76	0.0427	1.81	166
28 Feb 2007 - 03:00	2.16	0.0825	2.98	222
28 Feb 2007 - 06:00	2.15	0.0810	2.13	159
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Standard Deviation	0.242	0.0143	0.48	48.9

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS February 2007 samples (0.0635 μ g/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 μ g/l) and less than to the averages of supplemental mercury testing conducted in previous analyses ssummarized in the next section.
- There was little variability among the results from individual grab samples (standard deviation = $0.014~\mu g/l$) as shown in Table 1.
- Seven of the eight of the samples were above the recently revised ASWQS water quality standard criteria of $0.05~\mu g/l$. The current NPDES Permit does <u>not</u> have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS February 2007 samples was $2.05~\mu g/l$ (Table 1). The average concentrations reported for this sampling period are less than those reported for previous analyses as described in the next section.
- There was little variability among the copper results from the eight individual grab samples with a standard deviation of $0.48 \mu g/l$.

³ Conducted in September 2004.

- All of the samples had copper concentrations below the ASWQS criterion⁴ of 3.1 μg/l. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μg/l, and daily maximum of 108 μg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

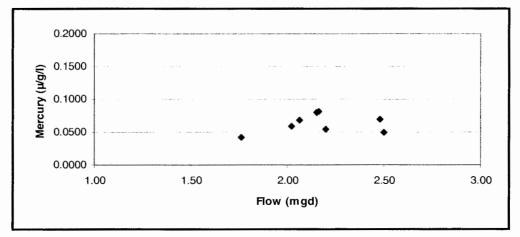


Figure 1. SKS effluent flow rate and mercury concentration (Feb 2007)

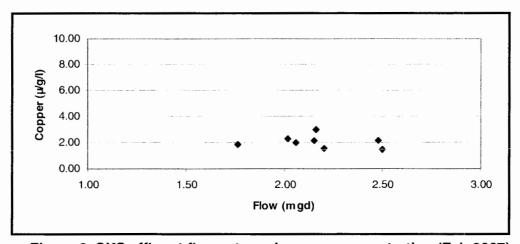


Figure 2. SKS effluent flow rate and copper concentration (Feb 2007)

The results of the sample testing for zinc indicate:

 The average zinc concentration for the SKS February 2007 samples was 191 μg/l (Table 1). This concentration is less than the average values for previous analyses described in the next section.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 48.9) with a range between $142 \,\mu\text{g/l}$ and $296 \,\mu\text{g/l}$ (Table1).
- All eight zinc samples were above the ASWQS criteria of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

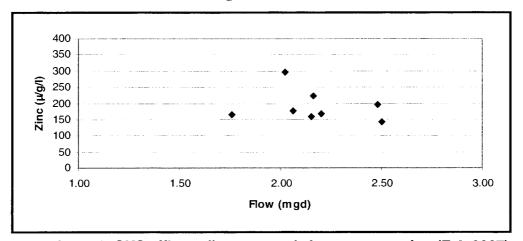


Figure 3. SKS effluent flow rate and zinc concentration (Feb 2007)

Comparison to Previous Tests

A summary of the semi annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution. The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

 D_R = is the dilution required to reduce the concentration to the ASWQS

 C_E = the effluent concentration

 C_A = the maximum receiving water concentration

 C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

					s Testing F SWQS Crit		
Parame	eter	Mer	cury	Co	pper	Z	inc
Water Quality	Criterion		i μ g/l		μ g/i	81	μ g/l
Ambient Ma			32 μ g/l		3 μ g/l		5 μ g/l
Sample	Flow	Conc.	Dilution	Conc.	Dilution	Conc.	Dilution
Date	(mgd)	(μg/l)	Required	(μ g/l)	Required	(μ g/l)	Required
	2.44	0.0734	1.87				
	3.05	0.109	3.20				
	3.02	0.101	2.90				
Aug 2005	2.39	0.122	3.69				
Aug 2003	2.55	0.177	5.74				
	2.8	0.153	4.84				
	2.03	0.112	3.31				
	2.14	0.0912	2.54				
	1.98	0.107	3.13	3.63	1.23	264	3.27
	2.63	0.083	2.23	2.82		196	2.43
	2.6	0.298	10.25	2.17		146	1.81
Feb 2006	1.94	0.088	2.42	3.61	1.22	226	2.80
reb 2006	1.95	0.096	2.72	3.67	1.25	340	4.22
	2.16	0.092	2.57	2.44		267	3.31
	2.53	0.102	2.94	1.79		190	2.35
	2.15	0.145	4.54	4.83	1.76	266	3.30
	2.03	0.0802	2.13	2.92		200	2.48
	2.12	0.0820	2.19	3.93	1.37	272	3.37
	2.22	0.150	4.73	4.32	1.54	368	4.57
Nov 2006	2.76	0.140	4.36	3.3	1.09	322	4.00
1100 2006	2.59	0.106	3.09	3.14	1.02	329	4.08
	2.40	0.104	3.01	2.79		246	3.05
	2.41	0.158	5.03	3.35	1.11	278	3.45
	2.60	0.115	3.43	2.28		195	2.42
	2.20	0.0550	1.19	1.56		169	2.09
	2.02	0.0586	1.32	2.31		296	3.67
	2.06	0.0676	1.66	2.02		178	2.21
F-5 0007	2.50	0.0501	1.00	1.43		142	1.76
Feb 2007	2.48	0.0704	1.76	2.16		196	2.43
	1.76	0.0427		1.81		166	2.06
	2.16	0.0825	2.21	2.98		222	2.75
	2.15	0.0810	2.16	2.13		159	1.97
Minimum	1.76	0.04	1.00	1.43	1.02	142.00	1.76
Average	2.34	0.11	3.17	2.81	1.29	234.71	2.91
Maximum	3.05	0.30	10.25	4.83	1.76	368.00	4.57

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:16. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I Chain-of-Custody

The second secon	Carrier out formation of the Contract of the C		
Process and Track your shipment online: http://w	ww.dhl.com	DESTINATION CODE	İ
1-800-CALL-DHL in USA only 1 Payer account number and shipment value protection details	800 3355 813 FDC1	KIS	+
Charge to Shipper Receiver 3rd Party Cash		8 Products & Services	
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L Doct/710 Code (required)	FUR LARDRATORY MINETS	SERVICES CHARGES	HIL EXPRESS
Post/ZiP Code (required) Phone, Fax, or E-mail (required) CX4CHH LIZ3	NO COMMESCIAL VALUE	SERVICES CHARGES	SS (USA), INC
3 To (Receiver)	6 Dutiable Shipments Only (Customs requirement)		N N
COLUMBIA ANALYTICAL SLRVICES	Attach the original and four copies of a Proforme or Commercial Invoice. Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN	8	
Contact Person HARVEY JACKY	Declared Value for Customs (In US \$) Schedule B Number / Harmonized Code (If applicable)	Drop Box # TOTAL	
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,	The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration, Diversion to countries contrary to U.S. law prohibited.	Type Expires	a Hilli
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Post/ZIP Code (required) Phone, Fax, or E-mail (required) 360-577-7222	Signature (required) Date MA4 07	Time 1017 Date 2111	3

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CHAIN OF CUSTODY

5561567													
PROJECT:	StarKist Efflu	ent Mon	itoring - Sk	(S0701.NT				·					
FROM:	Karen Glatze	l, gdc											
	P.O. Box 123	88, Trinic	lad, CA, 95	5570-1238			707-677-0123 gdcocn@eathlink						net
TO:	Harvey Jacky	, Colum	bia Analyti	cal Services									
	1317 South 1					360-577-7222							
				NUMBER OF			ANAL	YSIS REQUES					COMMENTS
SAMPLE I.D.	DATE	TIME	MATRIX	CONTAINERS	Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a	Cu	Zn	Hg	COMMENTS
SKS-1	2/28/2007		Water	2						Х	X	Х	
SKS-2	2/28/2007		Water	2						X	X	X	
SKS-3	2/28/2007		Water	2						X	Х	X	
SKS-4	2/28/2007		Water	2						X	X	X	Total metals
SKS-5	2/28/2007		Water	2						X	X	Х	Jotal metals
SKS-6	2/28/2007		Water	2						X	X	X	
SKS-7	2/28/2007		Water	2						X	X	X]
SKS-8	2/28/2007		Water	2						Х	X	X	
										 -		 	
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SAMPLED BY	'· K. Glatzel	RAG		DATE/TIME:	2/28/	/2007	SPECIAL	NSTRUCTIONS	S/REMARKS:	L		<u></u>	
SHIPPED VIA		JON .		DATE/TIME:		2007		ple may be as r		eawate	er		
RELINQUISH		sta Z	11/	DATE/TIME:	3/1/2	2007		o, MS, MSD as					
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ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

Glatzel da Costa, gdc

0701 NT

K0701734

Project:

Starkist Effluent Monitoring/SKS0701.NT

Service Request No.: Date Received:

3/5/07

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/5/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by #6 Date 3/20/07

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case parrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Analytical Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

Sample Matrix:

Water

Service Request: K0701734

Date Collected: 2/28/07 Date Received: 3/5/07

Mercury, Total

Prep Method:

METHOD

Analysis Method: 1631E

Test Notes:

Units: ng/L

Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
P = 2						•		
SKS-1	K0701734-001	1.0	0.05	1	3/5/07	3/12/07	55.0	
SKS-2	K0701734-002	1.0	0.05	1	3/5/07	3/12/07	58.6	
SKS-3	K0701734-003	1.0	0.05	1	3/5/07	3/12/07	67.6	
SKS-4	K0701734-004	1.0	0.05	1	3/5/07	3/12/07	50.1	
SKS-5	K0701734-005	1.0	0.05	1	3/5/07	3/12/07	70.4	
SKS-6	K0701734-006	1.0	0.05	1	3/5/07	3/12/07	42.7	
SKS-7	K0701734-007	1.0	0.05	1	3/5/07	3/12/07	82.5	
SKS-8	K0701734-008	1.0	0.05	1	3/5/07	3/12/07	81.0	
Method Blank	K0701734-MB1	1.0	0.05	1	3/5/07	3/12/07	0.2	В
Method Blank	K0701734-MB2	1.0	0.05	1	3/5/07	3/12/07	0.07	В
Method Blank	K0701734-MB3	1.0	0.05	1	3/5/07	3/12/07	0.1	В

QA/QC Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

Sample Matrix:

Water

Service Request: K0701734

Date Collected: 2/28/07 **Date Received:** 3/5/07

Date Extracted: 3/5/07

Date Analyzed: 3/12/07

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

SKS-1

Lab Code:

K0701734-001MS,

K0701734-001MSD

Units: ng/L

Basis: NA

Test Notes:

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL		Level DMS	Sample Result	Spike MS	Result DMS	MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	1.0	25	25	55.0	81.8	83.3	107	113	71-125	2	

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project:

Starkist Effluent Monitoring/SKS0701.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA

Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Acceptance Result Prep Analysis True Percent Value Recovery Limits Notes Method Method Result Analyte Mercury METHOD 1631E 5.00 5.44 109 77-123

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project:

Starkist Effluent Monitoring/SKS0701.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA
Date Extracted: 3/5/07

Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

						CAS Percent Recovery	
Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

QA/QC Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

LCS Matrix:

Water

Service Request: K0701734

Date Collected: NA
Date Received: NA

Date Extracted: 3/5/07 Date Analyzed: 3/12/07

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Prep **Analysis** True Percent Acceptance Result Method Value Recovery Limits Notes Analyte Method Result Mercury METHOD 1631E 5.00 5.32 106 77-123

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0701734-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	1.56		
Zinc	200.8	1.04	0.10	1	3/13/07	3/15/07	169		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0701734-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	2.31		
Zinc	200.8	10.80	1.08	10	3/13/07	3/15/07	296		

% Solids:

0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0701734-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.02		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	178		

% Solids:

0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0701734-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	1.43		
Zinc	200.8	1.08	0.11	1	3/13/07	3/15/07	142	\Box	

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L Basis: NA

Lab Code: K0701734-005

Sample Name: SKS-5

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	2.16		
Zinc	200.8	10.20	1.02	10	3/13/07	3/15/07	196		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: $\mu G/L$

Basis: NA

Sample Name: SKS-6

Lab Code: K0701734-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	1.81		
Zinc	200.8	1.02	0.10	1	3/13/07	3/15/07	166		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0701734-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.98		
Zinc	200.8	10.50	1.05	10	3/13/07	3/15/07	222		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0701734-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.13		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	159		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L Basis: NA

Sample Name: Method Blank

Lab Code: K0701734-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.10	0.01	1	3/13/07	3/15/07	0.01	ט	
Zinc	200.8	0.50	0.05	1	3/13/07	3/15/07	0.05	ט	

0.0 % Solids:

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source: Inorganic Ventures

CCV Source: Various

	Initial	Calibratio	n		Continui	ng Calib	ration		
Analyte	True	Found	%R (1)	True	Found	%R(1)	Found	%R(1)	Method
Copper	12.5	12.7	102	25.0	25.5	102	23.3	93	200.8
Zinc	25.0	25.8	103	25.0	25.5	102	23.3	93	200.8

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source:

Various

	Initial	Calibrat	ion		Continui	ing Calib	ration		_
Analyte	True	Found	%R (1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	24.2	97	24.9	100	200.8
Zinc				25.0	24.6	98	25.0	100	200.8

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

	Initia	l Calibrat	ion		Continui	ng Calib	ration		
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	25.1	100			200.8
Zinc				25.0	25.5	102			200.8

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

	CRDL Sta	andard for AA		П	Init	CRDL Standar	d for I	CP Final				
Analyte	True	Found	%R		True Found &R Found							
Copper			ł	П	1.0	1.08	108					
Zinc				Πİ	5.0	5.05	101					

METALS -3-BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name:

Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)		Continuing Calibration Preparation Blank (ug/L) Blank						Method		
Analyte	(49, 2,	С	1	С	2 0	2	3	c	С		!
Copper	0.10	Ū	0.10	บ	0.10	1	0.10	U			200.8
Zinc	0.50	Ü	0.50	U	0.50	ī	0.50	υ			200.8

METALS - 3 -BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name:

Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

Analyte	Initial Calib. Blank (ug/L)	С			ing Cal nk (ug/		С	Preparation Blank C	Method
Copper		T	0.10	U	0.10	Ū			200.8
Zinc		1	0.50	ט	0.50	U			200.8

METALS

-7 -LABORATORY CONTROL SAMPLE

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source:

Inorganic Ventures

Solid LCS Source:

	Aqueous ug/L	,	Solid (mg/kg)						
Analyte	True Found	%R	True	Found	С	Limits	%R		
Copper	2.00 1.	98 99							
Zinc	2.00 2.	02 101	İ			1			

METALS

-7-

LABORATORY CONTROL SAMPLE

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source:

Inorganic Ventures

Solid LCS Source:

	Aqueous u	g/L			/kg)			
Analyte	True Fou	nd	%R	True	Found	С	Limits	%R
Copper	2.00	1.94	97		1		1	
Zinc	2.00	1.95	98			1		

-10-

METHOD DETECTION LIMITS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back- ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.00	0.10	200.8
Zinc	66		5.00	0.50	200.8

Comments:	

Columbia Analytical Services

METALS

-12-

ICP LINEAR RANGES (QUARTERLY)

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

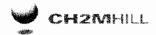
SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP ID Number:

Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	1000.0	200.8
Zinc	15.00	1000.0	200.8



Steve Costa Karen Glatzel 216 Driftwood Lane P.O. Box 1238 Trinidad, CA 95570-1238 707-677-0123 (Tel) 707-677-9210 (Fax) 510-508-5020 (Cell)

18 Jan 2006

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

Enclosed is the report for the supplementary effluent mercury test results for StarKist Samoa. The samples were taken concurrently with the August 2005 effluent toxicity sampling for the Joint Cannery Outfall in American Samoa. The sampling and analysis were carried out without problems.

The samples were collected on the 30th and 31st of August 2005 and shipped via DHL on the 1st of September 2005. Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Kan a blogs

Steven L. Costa

cc:

Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte;

David Wilson, CH2M HILL.

Encl: Supplemental Effluent Mercury Testing - StarKist Samoa, August 2005 Sampling



TECHNICAL MEMORANDUM

SUPPLEMENTAL EFFLUENT MERCURY TESTING - STARKIST SAMOA AUGUST 2005 SAMPLING

Prepared For:

StarKist Samoa (NPDES Permit AS0000019)

Prepared By:

Steve Costa

Karen Glatzel

Date:

16 January 2006

Distribution:

Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

As a condition of the StarKist Samoa NPDES permit, a priority pollutant scan of the effluent was required and completed. This information was used to support the application for permit renewal that was submitted to the U.S. Environmental Protection Agency (USEPA), Region 9 in July 2005. StarKist Samoa has approved mixing zones for nutrients (total nitrogen and total phosphorus), ammonia, copper, and zinc. The results of the priority pollutant scan did not reveal any additional constituents of concern with the single exception of mercury. The mercury concentration reported in the priority pollutant scan was $0.27~\mu g/l$, which is above the anticipated revision to the American Samoa Water Quality Standards (ASWQS) of $0.05~\mu g/l$ proposed by the American Samoa Environmental Protection Agency (ASEPA).

The reported level of mercury, if representative, will require a mixing zone to achieve compliance with the revised ASWQS. Receiving water concentrations indicate that there is sufficient assimilative capacity to define an approvable mixing zone. To further investigate the mercury levels in the effluent, grab samples were collected at the time of sampling for the August 2005 bioassay testing and sent to Columbia Analytical Services (CAS) laboratory for analysis. This Technical

Memorandum presents the supplemental mercury sampling approach and methods, results, and discission.

Approach and Methods

Sampling and sample handling followed the standard operating procedures (SOPs) that were developed and then approved for use by the USEPA and ASEPA for previous cannery effluent sampling were used for this supplemental mercury sampling. Between 13:00 on 30 August 2005 and 10:00 on 31 August 2005, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling sites. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each plant. Samples were collected at approximately three-hour intervals over the 24-hour period. The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected CAS laboratory supplied sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The sample was shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for mercury are summarized in Table 1. The laboratory data report is provided in Attachment 2. The results of the supplemental analyses are summarized as follows:

- The average mercury concentration for the supplemental samples (0.117 μ g/l) is less than half the value reported in the priority pollutant scan (0.27 μ g/l).
- There is little variability among the results from individual grab samples (standard deviation = $0.033 \mu g/I$).
- All of the samples were above the proposed ASWQS limitation of 0.05 μg/l, but are below the current ASWQS, which is based on the EPA National Recommended Water Quality Criteria (0.94 μg/l).

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

Table 1 StarKist Samoa Effluent Flows and Mercury Concentrations August 2005									
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)						
1	30 August 2005 13:00	2.44	0.0734						
2	16:00	3.05	0.109						
3	19:00	3.02	0.101						
4	22:00	2.39	0.122						
5	31 August 2005 01:00	2.55	0.177						
6	04:00	2.80	0.153						
7	07:00	2.03	0.112						
8	10:00	2.14	0.0912						
Minimum	The same of the sa	2.03	0.0734						
Average		2.55	0.1173						
Maximum		3.05	0.1770						
Standard Deviation		0.38	0.0334						

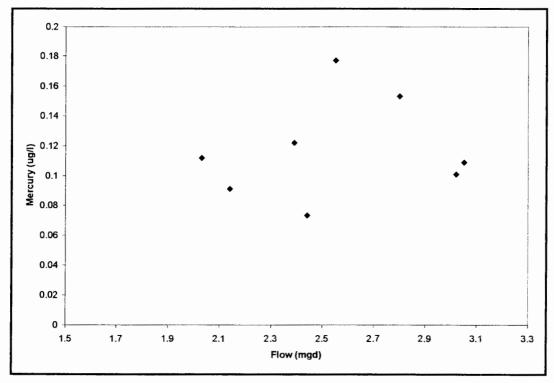


Figure 1. Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Discussion

Based on the available data a mixing zone will be required for mercury to comply with the proposed revisions to the ASWQS (0.05 μ g/l). The highest value recorded was from the priority pollutant scan (0.27 μ g/l). The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies is 0.0232 μ g/l. The dilution required to reduce the effluent concentration to the ASWQS is less than 10:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser. If the maximum effluent concentration from the supplemental monitoring is used (0.177 μ g/l) the dilution required is less than 6:1. The calculations are summarized below. The available data clearly indicate that a mixing zone can be established for mercury.

Calculation of Required Dilution

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/l

 C_S = proposed ASWQS = 0.05 μ g/l

For $C_E = 0.27 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.27 - 0.0232}{0.05 - 0.0232} = 9.2$$

For $C_E = 0.177 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.177 - 0.0232}{0.05 - 0.0232} = 5.7$$

ATTACHMENT I Chain-of-Custody

Process and Track your shipment online: http://w 1-800-CALL-DHL in USA only Shipment (Not reg		DESTINATION CODE
The payer account number and shipment value protection details charge to Shipper Receiver And Party Cash Check Check Check Shipment Value Protection (see reverse) Yes Declared Value for Carriage (in US \$) 5 16 in all countries.		B Products & Services DOMESTIC EXPRESS U.S. Express Envelope USA Overnigh Other: PA
2 From (Shipper) Shipper's Account Number Contact Name JUE CARNET	7820769404 4 Shipment Details	WORLDWIDE EXPRESS Int'l Express Envelope Non-Dutable WorldFreight Non-Dutable WorldFreight
Shipper's Reference (up to 35 characters) 147 3 2 3 . J C . 05 . T W Company Name	Total Number of Packages If DHL Express Document packaging used, enter XD. Total Weight Dimensions (in inches) Pieces Length Width Height Pieces Length Width Height Pieces Length Piec	Dullable Other. Service Options (extra charges may apply) Saturday Saturday Pickup. Hold For Pickup* Delivery Notification US deliveries only
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Contact Name HIP 2UE Y JACKY Delivery Address DHL Cannot Deliver to a PO Box	Value for Customs (in US \$) (as on Commercial/Pro Forma Invoice)	Drop Box # TOTAL & & & & & & & & & & & & & & & & & & &
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Country USA	U.S. Bureau of Export Administration, Diversion to countries contrary to U.S. law prohibited. 7 Shipper's Authorization (signature required) I we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse), tiwe authorize DHL to complete other documents necessary to export this shipment. We understand that Shipment are proposed to 3rd party relaxed to party five agree to pay all charges if the recipient or 3rd party relaxed to pay five understand that DHL DOES NOT TRANSPORT CASH.	Type Expires Auth. PICKED UP BY C. Route No.
Phone, Fax, or E-mail (required) 360-577-7222	recipient or 3rd party reliase to part the word stand that DHL DOES NOT TRANSPORT CASH. Signature (required) Date /	Route No. Time Date



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1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

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ATTACHMENT II

Columbia Analytical Systems Laboratory Report



October 17, 2005

Service Request No: K0503686

Steve Costa CH2M Hill 216 Driftwood Lane P.O. Box 1238 Trinidad, CA 95570-1238

RE: Joint Cannery Outfall/147323.JC.05.PR-SKS

Dear Steve:

Enclosed are the results of the sample(s) submitted to our laboratory on September 7, 2005. For your reference, these analyses have been assigned our service request number K0503686.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Project Chemist

HJ/jeb

Page 1 of _

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative
- # The control limit criteria is not applicable. See ease narrative
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRI, but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Client:

CH2M Hill

Service Request No.:

K0503686

Project:

Joint Cannery Outfall / 147323.JC.05.PR-SKS

Date Received:

9/7/05

ί

Sample Matrix: Wa

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 9/7/05. The following discrepancies were noted upon initial sample inspection. The temperatures of the shipping coolers were above the upper recommended limit of 6 °C. The exceptions are also noted on the cooler receipt and preservation form included in this data package. Except as noted, the samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

#1 Date 10/10/05

Analytical Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Date Collected:

Date Received: 9/7/05

Sample Matrix: Water

Mercury, Total

Prep Method:

METHOD

Units: ng/L Basis: NA

Analysis Method: 1631E Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0503686-001	5.0	0.5	5	10/12/05	10/13/05	73.4	
SKS-2	K0503686-002	5.0	0.5	5	10/12/05	10/13/05	109	
SKS-3	K0503686-003	5.0	0.5	5	10/12/05	10/13/05	101	
SKS-4	K0503686-004	5.0	0.5	5	10/12/05	10/13/05	122	
SKS-5	K0503686-005	5.0	0.5	5	10/12/05	10/13/05	117	
SKS-6	K0503686-006	5.0	0.5	5	10/12/05	10/13/05	153	
SKS-7	K0503686-007	5.0	0.5	5	10/12/05	10/13/05	112	
SKS-8	K0503686-008	5.0	0.5	5	10/12/05	10/13/05	91.2	
Method Blank 1	K0503686-MB1	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 2	K0503686-MB2	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 3	K0503686-MB3	1.0	0.1	1	10/12/05	10/13/05	ND	

QA/QC Report

Client:

CH2M Hill

Project:

Sample Matrix:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Water

Service Request: K0503686

Date Collected: NA Date Received: NA

Date Extracted: 10/12/05 Date Analyzed: 10/13/05

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

Batch QC

K0503565-002S,

K0503565-002DS

Units: ng/L Basis: NA

Lab Code: Test Notes:

Percent Recovery

											CAS	Relative	
	Prep	Analysis		Spike	Level	Sample	Spike	Result			Acceptance	Percent	Result
Analyte	Method	Method	MRL	MS	DMS	Result	MS	DMS	MS	DMS	Limits	Difference	Notes
Mercury	METHOD	1631E	1.0	25.0	25.0	5.9	34.5	33.6	114	111	71-125	3	

QA/QC Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Date Collected: NA

LCS Matrix:

Water

Date Received: NA **Date Extracted:** 10/12/05

Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Prep Analysis True Percent Acceptance Result Analyte Method Method Value Result Recovery Limits Notes Mercury METHOD 1631E 5.00 5.07 101 77-123

QA/QC Report

Client:

CH2M Hill

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Service Request: K0503686 Date Collected: NA

LCS Matrix:

Date Received: NA

Date Extracted: 10/12/05 Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS

Percent Recovery

Prep Analysis True Percent Acceptance Result Method Analyte Method Value Result Recovery Limits Notes Mercury METHOD 1631E 5.00 5.14 103 77-123

QA/QC Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS Water

Date Collected: NA

LCS Matrix:

Date Received: NA

Date Extracted: 10/12/05

Date Analyzed: 10/13/05

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Lab Code:

Basis: NA

Test Notes:

CAS

Percent Recovery Prep Analysis True Percent Acceptance Result Analyte Method Method Value Result Recovery Limits Notes 77-123 Mercury METHOD 1631E 5.00 5.03 101

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING - STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered high rate diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a zone of mixing (ZOM) based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a ZOM for mercury.

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data are reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

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¹ Submitted to USEPA in July 2005.

results reported here are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOPs) that were previously developed and approved by the USEPA and the American Samoa Environmental Protection Agency (ASEPA) for cannery effluent sampling. Between 09:00 on 28 February 2006 and 06:00 on 01 March 2006, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each cannery. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied mercury and ICP metals (for copper and zinc) sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS March 2006 samples (0.126 μ g/l; Table 1) is less than half the value reported in the priority pollutant scan³ (0.27 μ g/l) and close to the average of supplemental mercury testing conducted in August 2005 (0.117 μ g/l).
- There was some variability among the results from individual grab samples (standard deviation = $0.072 \,\mu g/l$), primarily because of one value of $0.298 \,\mu g/l$ that is approximately three timed higher than other values (Table 1).
- All of the samples were above the recently revised ASWQS water quality standard criterion of 0.05 μ g/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 μ g/l). The current NPDES Permit does not have a limitation for mercury.

 $^{^2}$ Results of the SKS metals analyses and the bioassay testing are presented in separate Technical Memorandums.

³ Conducted in September 2004.

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS March 2006 samples was 3.120 μ g/l (Table 2).
- There was noticeable variability among the results from the eight individual copper grab samples (standard deviation = 0.996 μ g/l) with a range between 1.79 μ g/l and 4.83 μ g/l (Table 2).
- Four out of eight copper samples were below the ASWQS criterion⁴ of 3.1 μg/l, three copper samples were measured near 3.6 μg/l. One sample (Grab 8) was measured at 4.830 μg/l, still well below the NPDES permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent copper concentration as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the March 2006 samples was 237 μ g/1 (Table 3).
- There was a noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 60) with a range between 146 μ g/l and 340 μ g/l (Table 3).
- All of the eight zinc samples were above the ASWQS criterion⁵ of 81 μ g/l. All values were well below the current NPDES Permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to shows ASWQS will be achieved within the zone of initial dilution.

<u>Mercury:</u> Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 μ g/l). The highest value recorded from the March 2006 sampling was 0.298 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 0.0232 μ g/l.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

The dilution required to reduce the effluent concentration to the ASWQS is less than 10.3:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser.

<u>Copper:</u> A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 μ g/l) is calculated below. The highest value of copper recorded from the March 2006 sampling was 4.830 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge was 0.83 μ g/l6.

The dilution required to reduce the effluent concentration to the ASWQS is less than 1.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within a meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 μ g/l), are provided below. The highest value recorded from the March 2006 sampling was 340 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 5.5 μ g/l7.

The dilution required to reduce the effluent concentration to the ASWQS is less than 4.4:1. This dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured excluding outliers greater than three standard deviations from the mean.

Table 1
StarKist Samoa Effluent Flows and Mercury Concentrations
28 February - 1 March 2006

Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)
1	28 Feb 2006 09:00	1.98	0.107
2	12:00	2.63	0.083
3	15:00	2.60	0.298
4	18:00	1.94	0.088
5	21:00	1.95	0.096
6	24:00	2.16	0.092
7	1 March 2006 03:00	2.53	0.102
8	06:00	2.15	0.145
Minimum		1.94	0.083
Average		2.24	0.126
Maximum		2.63	0.298
Standard Deviation		0.30	0.072

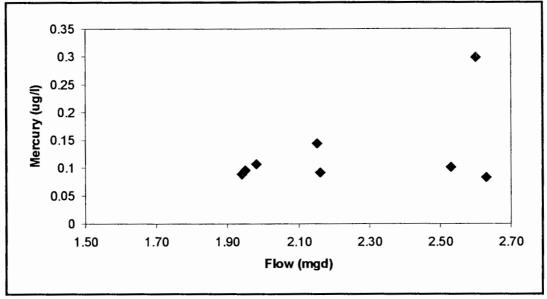


Figure 1. Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Table 2
StarKist Samoa Effluent Flows and Copper Concentrations
28 February - 1 March 2006

Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations (µg/I)
1	28 Feb 2006 09:00	1.98	3.630
2	12:00	2.63	2.820
3	15:00	2.60	2.170
4	18:00	1.94	3.610
5	21:00	1.95	3.670
6	24:00	2.16	2.440
7	1 March 2006 03:00	2.53	1.790
8	06:00	2.15	4.830
Minimum		1.94	1.790
Average		2.24	3.120
Maximum		2.63	4.830
Standard Deviation		0.30	0.996

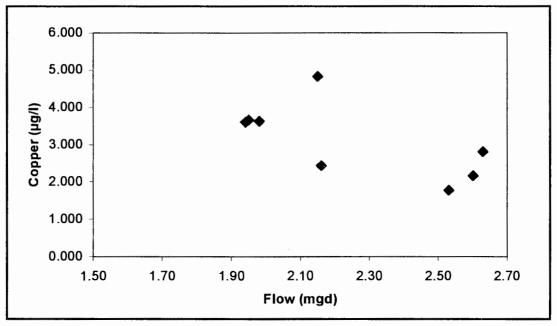


Figure 2. Scatter plot of StarKist Samoa effluent flow rate and copper concentration

Table 3									
StarKist Samoa Effluent Flows and Zinc Concentrations									
	28 February - 1 March 2006								
Grab		Effluent Flow	Zinc						
Sample Number	Sampling Date and Time	Rate (mgd)	Concentrations (µg/l)						
1	28 Feb 2006 09:00	1.98	264						
2	12:00	2.63	196						
3	15:00	2.60	146						
4	18:00	1.94	226						
5	21:00	1.95	340						
6	24:00	2.16	267						
7	1 March 2006 03:00	2.53	190						
8	06:00	2.15	266						
Minimum		1.94	146						
Average		2.24	237						
Maximum		2.63	340						
Standard Deviation		0.30	60						

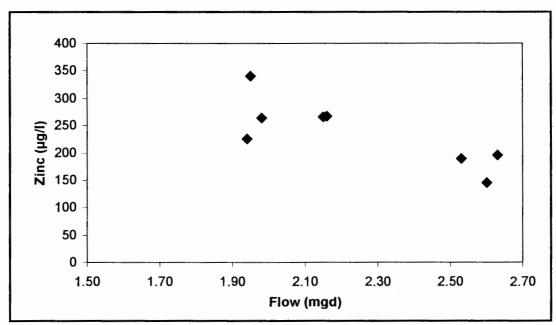


Figure 3. Scatter plot of StarKist Samoa effluent flow rate and zinc concentration

Table 4. Calculations of Required Dilution

Calculation of Required Dilution for Mercury

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/l

 C_S = proposed ASWQS = 0.05 μ g/1

For $C_E = 0.298 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.298 - 0.0232}{0.05 - 0.0232} = 10.3$$

Calculation of Required Dilution for Copper

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.83 μ g/l

 $C_S = ASWQS = 3.1 \mu g/l$

For $C_E = 4.830 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.830 - 0.83}{3.1 - 0.83} = 1.8$$

Calculation of Required Dilution for Zinc

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 5.5 μ g/l

 $C_S = ASWQS = 81 \mu g/l$

For $C_E = 340 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{340 - 5.5}{81 - 5.5} = 4.4$$

ATTACHMENT I Chain-of-Custody

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CHAIN OF CUSTODY

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1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068 PROJECT NAME JOINT CANHEN EFFWENT MONITORING 147323. JC. 06. NT STEVE COSTA CH2M HILL 0 9 P.O. BOX 1238 CITY'STATE/ZIP TRIHIDAD, CA 96570 SCOSTA@ CHZM, COM PHONE 707-677-0123 FAX 707-677-9210 REMARKS LAB I.D. MATRIX TIME DATE 3/1/06 2 5KS-1 5K5-2 2 2 X 5KS-3 SK5-4 5K3-5 X Z 5K5-6 X SKS-7 2 SK3-8 X INVOICE INFORMATION Circle which metals are to be analyzed: REPORT REQUIREMENTS P.O. # Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zo Hg Routine Report: Method Bill To: ____ Blank, Surrogate, as Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg required 'INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: X II. Report Dup., MS, MSD as TURNAROUND REQUIREMENTS SPECIAL INSTRUCTIONS/COMMENTS PLEASE PROVIDE SEPARTER REPORTS FOR SKS-# AND COS-# SAMPLES

• SKS-# SAMPLES MAY BY & 40% SEAWATER _____ 24 hr. _____48 hr. III. Data Validation Report ____5 Day (includes all raw data) ___ Standard (10-15 working days) ___ IV. CLP Deliverable Report ____ Provide FAX Results ___ V. EDD SHIP DHL WAYBILL 782-0788-415 Requested Report Date RELINQUISHED BY: RECEIVED BY: Date/Time Signature Date/Time Signature Firm Printed Name Printed Name Firm Printed Name

ATTACHMENT II

Columbia Analytical Systems Laboratory Report



March 16, 2006

Service Request No: K0601753

Steve Costa CH2M Hill 216 Driftwood Lane P.O. Box 1238 Trinidad, CA 95570-1238

RE: Joint Cannery Effluent Monitoring/147323.JC.06.NT

Dear Steve:

Enclosed are the results of the sample(s) submitted to our laboratory on March 06, 2006. For your reference, these analyses have been assigned our service request number K0601753.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Project Chemist

HJ/jm

Page 1 of _

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See ease narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Client:

CH2M Hill

Service Request No.:

K0601753

Project:

Joint Cannery Effluent Monitoring / 147323.JC.06.NT

Date Received:

3/6/06

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory; Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/6/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

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Approved by	Date_	3/20/06	00065

Analytical Report

Client:

CH2M Hill

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Project: Sample Matrix:

Water

Service Request: K0601753

Date Collected: 3/1/06 Date Received: 3/6/06

Mercury, Total

Prep Method:

METHOD

Analysis Method: 1631E

Units: ng/L Basis: NA

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0601753-001	5.0	0.5	5	3/7/06	3/13/06	107	
SKS-2	K0601753-002	5.0	0.5	5	3/7/06	3/13/06	82.6	
SKS-3	K0601753-003	5.0	0.5	5	3/7/06	3/13/06	298	
SKS-4	K0601753-004	5.0	0.5	5	3/7/06	3/13/06	87.5	
SKS-5	K0601753-005	5.0	0.5	5	3/7/06	3/13/06	95.9	
SKS-6	K0601753-006	5.0	0.5	5	3/7/06	3/13/06	92.3	
SKS-7	K0601753-007	5.0	0.5	5	3/7/06	3/13/06	102	
SKS-8	K0601753-008	5.0	0.5	5	3/7/06	3/13/06	145	
Method Blank 1	K0601753-MB1	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 2	K0601753-MB2	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 3	K0601753-MB3	1.0	0.1	1	3/7/06	3/13/06	ND	

QA/QC Report

Client: Project:

Sample Matrix:

CH2M Hill

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Service Request: K0601753

Date Collected: NA Date Received: NA

Date Extracted: 3/7/06 Date Analyzed: 3/13/06

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

Batch QC

Lab Code:

Units: ng/L

Basis: NA

Test Notes:

K0601634-001S, K0601634-001SD

Percent Recovery

	Prep	Analysis		Snike	Level	Sample	Spike				CAS Acceptance	Relative	Result
Analyte	Method	Method	MRL	•	DMS	•	MS	DMS	MS	DMS	Limits	Difference	Notes
Mercury	METHOD	1631E	1.0	25	25	17.4	46.4	44.6	116	109	71-125	4	

QA/QC Report

Client:

CH2M Hill

Service Request: K0601753

Project:

LCS Matrix:

Joint Cannery Effluent Monitoring/147323.JC.06.NT Water

Date Collected: NA

Date Received: NA

Date Extracted: 3/7/06

Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent

Recovery True Percent Acceptance Result Value Result Recovery Limits Notes

Analyte

Prep

Method

1631E

Analysis

Method

5.35

77-123

Mercury

METHOD

5.00

107

QA/QC Report

Client:

CH2M Hill

Service Request: K0601753

Project: LCS Matrix: Joint Cannery Effluent Monitoring/147323.JC.06.NT Water

NT

Date Collected: NA

Date Received: NA

Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

QA/QC Report

Client:

CH2M Hill

Project:

Joint Cannery Effluent Monitoring/147323.JC.06.NT

LCS Matrix: Water

Service Request: K0601753

Date Collected: NA
Date Received: NA

Date Extracted: 3/7/06

Date Analyzed: 3/13/06

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Lab Code:

K0601753-QCS

Units: ng/L

Basis: NA

Result

Notes

Test Notes:

CAS Percent Recovery

Prep Analysis True Percent Acceptance Analyte Method Method Value Result Recovery Limits METHOD 1631E 5.00 5.30 106 77-123 Мегсигу

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Date Received: 03/06/06

Project Name: Joint Cannery Effluent Monitoring

Units: µG/L

Basis: NA

Matrix:

WATER

Sample Name: SKS-1

Lab Code: K0601753-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.630	\neg	
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	264		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0601753-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.820		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	196		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Project No.: 147323.JC.06.NT

Date Received: 03/06/06

Matrix:

WATER

Units: $\mu G/L$

Basis: NA

Sample Name: SKS-3

Lab Code: K0601753-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.170		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	146		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0601753-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	U	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.610		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	226		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0601753-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.670		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	340		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0601753-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.440		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	267		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0601753-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	1.790		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	190		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0601753-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	4.830		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	266		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected:

Project Name: Joint Cannery Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0601753-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.100	0.005	1	3/10/06	3/14/06	0.005	U	
Zinc	200.8	0.50	0.02	1	3/10/06	3/14/06	0.02	В	

% Solids: 0.0

Comments:

00044

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/I

	Initial Calibration				Continu				
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper	12.5	12.4	99	25.0	25.7	103	25.0	100	200.8
Zinc	25.0	25.1	100	25.0	25.3	101	24.8	99	200.8

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monito

ICV Source:

CCV Source: Various

Concentration Units: ug/I

	Initia	l Calibra	tion		Continu	ing Cal	ibration		
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper		36.00	T	25.0	25.1	100			200.8
Zinc				25.0	24.9	100			200.8

METALS - 2b -CRDL STANDARD FOR AA AND ICP

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Concentration Units: ug/I

	CRDL St	andard for AA	Init	CRDL Stand	ard for	ICP Final	
Analyte	True	Found %R	True	Found	8R	Found	%R
Copper			1.0	1.01	101		
Zinc			5.0	4.57	91		

METALS - 3 -**BLANKS**

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Preparation Blank Matrix (soil/water): WATER Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	С			uing Ca ank (ug		•	С	Preparation Blank C	Method
Copper	0.050	ט	0.050	U	0.05	U	0.050	ט		200.8
Zinc	0.20	Ū	0.20	U	0.20	ט	0.20	ט		200.8

- 7 -

LABORATORY CONTROL SAMPLE

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

	Aqueous ug/L				Solid (mg/kg)					
Analyte	True	Found	8R	True	Found C	Limits	8R			
Copper	2.00	1.94	97		1 1					
Zinc	2.00	1.92	96							

- 7 -

LABORATORY CONTROL SAMPLE

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Aqueous ug/L			Solid (mg/kg)					
Analyte	True	Found	&R	True	Found	С	Limits	%R
Copper	2.00	2.00	100					
Zinc	2.00	1.94	97					

METALS -10-

METHOD DETECTION LIMITS

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitor

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back- ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.000	0.050	200.8
Zinc	66		5.00	0.20	200.8

Comments	

-12-

ICP LINEAR RANGES (QUARTERLY)

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monito

ICP ID Number:

Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	500.0	200.8
Zinc	15.00	500.0	200.8

Comments:



TECHNICAL MEMORANDUM

SUPPLEMENTAL EFFLUENT MERCURY TESTING - STARKIST SAMOA AUGUST 2005 SAMPLING

Prepared For:

StarKist Samoa (NPDES Permit AS0000019)

Prepared By:

Steve Costa

Karen Glatzel

Date:

16 January 2006

Distribution:

Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

As a condition of the StarKist Samoa NPDES permit, a priority pollutant scan of the effluent was required and completed. This information was used to support the application for permit renewal that was submitted to the U.S. Environmental Protection Agency (USEPA), Region 9 in July 2005. StarKist Samoa has approved mixing zones for nutrients (total nitrogen and total phosphorus), ammonia, copper, and zinc. The results of the priority pollutant scan did not reveal any additional constituents of concern with the single exception of mercury. The mercury concentration reported in the priority pollutant scan was 0.27 μ g/l, which is above the anticipated revision to the American Samoa Water Quality Standards (ASWQS) of 0.05 μ g/l proposed by the American Samoa Environmental Protection Agency (ASEPA).

The reported level of mercury, if representative, will require a mixing zone to achieve compliance with the revised ASWQS. Receiving water concentrations indicate that there is sufficient assimilative capacity to define an approvable mixing zone. To further investigate the mercury levels in the effluent, grab samples were collected at the time of sampling for the August 2005 bioassay testing and sent to Columbia Analytical Services (CAS) laboratory for analysis. This Technical

Memorandum presents the supplemental mercury sampling approach and methods, results, and discission.

Approach and Methods

Sampling and sample handling followed the standard operating procedures (SOPs) that were developed and then approved for use by the USEPA and ASEPA for previous cannery effluent sampling were used for this supplemental mercury sampling. Between 13:00 on 30 August 2005 and 10:00 on 31 August 2005, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling sites. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each plant. Samples were collected at approximately three-hour intervals over the 24-hour period. The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected CAS laboratory supplied sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The sample was shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for mercury are summarized in Table 1. The laboratory data report is provided in Attachment 2. The results of the supplemental analyses are summarized as follows:

- The average mercury concentration for the supplemental samples (0.117 μ g/l) is less than half the value reported in the priority pollutant scan (0.27 μ g/l).
- There is little variability among the results from individual grab samples (standard deviation = $0.033 \,\mu g/l$).
- All of the samples were above the proposed ASWQS limitation of 0.05 μ g/l, but are below the current ASWQS, which is based on the EPA National Recommended Water Quality Criteria (0.94 μ g/l).

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

StarKist Samo	a Effluent Flow	ole 1 s and Mercury Co st 2005	ncentrations
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)
1	30 August 2005 13:00	2.44	0.0734
2	16:00	3.05	0.109
3	19:00	3.02	0.101
4	22:00	2.39	0.122
5	31 August 2005 01:00	2.55	0.177
6	04:00	2.80	0.153
7	07:00	2.03	0.112
8	10:00	2.14	0.0912
Minimum		2.03	0.0734
Average		2.55	0.1173
Maximum		3.05	0.1770
Standard Deviation		0.38	0.0334

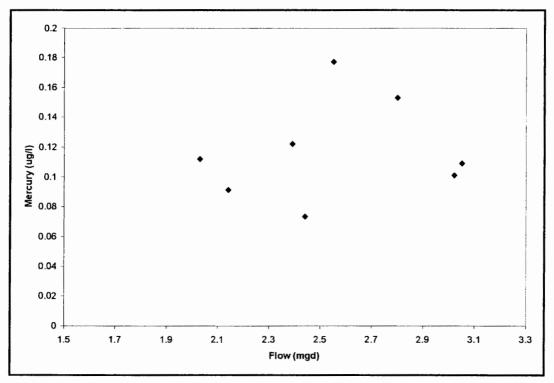


Figure 1. Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Discussion

Based on the available data a mixing zone will be required for mercury to comply with the proposed revisions to the ASWQS (0.05 μ g/l). The highest value recorded was from the priority pollutant scan (0.27 μ g/l). The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies is 0.0232 μ g/l. The dilution required to reduce the effluent concentration to the ASWQS is less than 10:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser. If the maximum effluent concentration from the supplemental monitoring is used (0.177 μ g/l) the dilution required is less than 6:1. The calculations are summarized below. The available data clearly indicate that a mixing zone can be established for mercury.

Calculation of Required Dilution

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/l

 C_S = proposed ASWQS = 0.05 μ g/l

For $C_E = 0.27 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.27 - 0.0232}{0.05 - 0.0232} = 9.2$$

For $C_E = 0.177 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.177 - 0.0232}{0.05 - 0.0232} = 5.7$$

ATTACHMENT I Chain-of-Custody

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Post/ZIP Code (required) 96799	Phone, Fax, or E-mall (required) 684-644-4231	NO COMMERCIAL VAL		
To (Receiver)		6 Dutiable Shipments Only (Customs requirement)		
Company Name COLUMBIA A Contact Name	HALYTICAL SERVICES	Attach the original and four copies of a Commercial Invoice of Export License No/Symbol (if applicable) Receiver's VAT/GST or St		TOTAL
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KELSO, W	ASHINGTON	Destination Duties/Taxes If left blank, Receiver pays duties/taxes.	, 29 No.:	TAILS (Check, Card No.)
((22)		Receiver Shipper Other. Sector survived account number The commodities, technology or software to be exported from the U.S. are U.S. Bureau of Export Administration. Diversion to countries contrary to U.S.	in compliance with the S. law prohibited.	Expires
	CountryUSA	7 Shipper's Authorization (signature required) We agree that DHL's standard terms apply to this shipment and limit C damage to U.S. \$100. The Warsaw Convention may also apply (see reve)	Auth. HL's liability for loss or Se). I/we authorize OHL	IY C'
Post/ZIP Code (required)	Phone, Fax, or E-mail (required)	to complete other documents necessary to export this shipment. I'we under Value Protection is available on request, for an extra charge, time agree recipient or 3rd party refuser to pay, two understand that OHL DOES NOT	derstand that Shipment to pay all charges if the TRANSPORT CASH.	
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CHAIN OF CUSTODY

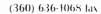
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ATTACHMENT II

Columbia Analytical Systems Laboratory Report





October 17, 2005

Service Request No: K0503686

Steve Costa CH2M Hill 216 Driftwood Lane P.O. Box 1238 Trinidad, CA 95570-1238

RE: Joint Cannery Outfall/147323.JC.05.PR-SKS

Dear Steve:

Enclosed are the results of the sample(s) submitted to our laboratory on September 7, 2005. For your reference, these analyses have been assigned our service request number K0503686.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Project Chemist

HJ/jeb

Page 1 of _

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative
- # The control limit criteria is not applicable. See case narrative
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result
- E The result is an estimate amount because the value exceeded the instrument calibration range
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the clution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Client:

CH2M Hill

Service Request No.:

K0503686

Project:

Joint Cannery Outfall / 147323.JC.05.PR-SKS

Date Received:

9/7/05

ί

Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 9/7/05. The following discrepancies were noted upon initial sample inspection. The temperatures of the shipping coolers were above the upper recommended limit of 6 °C. The exceptions are also noted on the cooler receipt and preservation form included in this data package. Except as noted, the samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

#1 Date 10/10/05

000:5

Analytical Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Date Collected:

Date Received: 9/7/05

Sample Matrix: Water

Mercury, Total

Prep Method:

METHOD

Units: ng/L Basis: NA

Analysis Method: 1631E

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0503686-001	5.0	0.5	5	10/12/05	10/13/05	73.4	
SKS-2	K0503686-002	5.0	0.5	5	10/12/05	10/13/05	109	
SKS-3	K0503686-003	5.0	0.5	5	10/12/05	10/13/05	101	
SKS-4	K0503686-004	5.0	0.5	5	10/12/05	10/13/05	122	
SKS-5	K0503686-005	5.0	0.5	5	10/12/05	10/13/05	117	
SKS-6	K0503686-006	5.0	0.5	5	10/12/05	10/13/05	153	
SKS-7	K0503686-007	5.0	0.5	5	10/12/05	10/13/05	112	
SKS-8	K0503686-008	5.0	0.5	5	10/12/05	10/13/05	91.2	
Method Blank 1	K0503686-MB1	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 2	K0503686-MB2	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 3	K0503686-MB3	1.0	0.1	1	10/12/05	10/13/05	ND	

QA/QC Report

Client: Project: CH2M Hill

Joint Cannery Outfall/147323.JC.05.PR-SKS

Service Request: K0503686

Date Collected: NA Date Received: NA

Date Extracted: 10/12/05

Sample Matrix:

Water

Date Analyzed: 10/13/05

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

Batch QC

Units: ng/L

Lab Code; Test Notes: K0503565-002S,

K0503565-002DS

Basis: NA

Percent Recovery

Analyte	Prep	Analysis		Snike	Level	Sample	Spike Result				CAS Acceptance	Relative Percent	Result	
	Method		MRL	•	DMS	Result	MS	DMS	MS	DMS	Limits	Difference	Notes	
Mercury	METHOD	1631E	1.0	25.0	25.0	5.9	34.5	33,6	114	111	71-125	3		

QA/QC Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Date Collected: NA Date Received: NA

LCS Matrix:

Date Extracted: 10/12/05

Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS

Percent Recovery Percent Acceptance Result Result Recovery Limits

Mercury

Analyte

METHOD

Prep

Method

1631E

Analysis

Method

101

Notes

5.00

True

Value

5.07

77-123

00013

K0503686ICP.JK2 - OPR (lcsw) 10/14/05

Page No.:

QA/QC Report

Client:

CH2M Hill

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Service Request: K0503686

Date Collected: NA

LCS Matrix: W

Water

Date Received: NA

Date Extracted: 10/12/05 Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Analysis True Percent Acceptance Prep Result Analyte Method Method Value Result Recovery Limits Notes Mercury **METHOD** 1631E 5.00 5.14 103 77-123

QA/QC Report

Client:

CH2M Hill

Service Request: K0503686

Project:

Joint Cannery Outfall/147323.JC.05.PR-SKS

Date Collected: NA

LCS Matrix:

Water

Date Received: NA Date Extracted: 10/12/05

Date Analyzed: 10/13/05

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Lab Code:

Basis: NA

Test Notes:

						CAS	
						Percent	
						Recovery	
	Prep	Analysis	True		Percent	Acceptance	Result
Analyte	Method	Method	Value	Result	Recovery	Limits	Notes
Mercury	METHOD	1631E	5.00	5.03	101	77-123	



Steve Costa	216 Driftwood Lane	707-677-0123 (Tel)
Karen Glatzel	P.O. Box 1238	707-677-9210 (Fax)
	Trinidad, CA 95570-1238	510-508-5020 (Cell)
		2 April 2007

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105
Mr. Pet
America
America
Programs
America
Programs
America
Programs
America
Programs
America

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

Enclosed is the report for the 2006-tradewind period effluent mercury, copper, and zinc results for StarKist Samoa. The samples were taken concurrently with the November 2006 effluent toxicity sampling for the Joint Cannery Outfall in American Samoa. The sampling and analysis were carried out without problems. The primary results were:

- The results for mercury are similar to those from the August 2005 and March 2006 sampling, and indicate that a mixing zone for mercury will be required and can be established well within the ZID.
- The results for copper were similar to the March 2006 sampling but lower than generally found over the permit period, and well below the permit limitations. The results indicate the established and approved mixing zone is necessary and adequately defined.
- The results for zinc were similar to the March 2006 sampling but somewhat lower than
 those generally found over the permit period, and well below the permit limitations.
 The results indicate the established and approved mixing zone is necessary and
 adequately defined.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel Steven L. Costa

the L Cent

cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte; David Wilson, CH2M HILL.

Encl: Effluent Metals Testing – StarKist Samoa, November 2006 Sampling

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING — STARKIST SAMOA NOVEMBER 2006 SAMPLING

Prepared For:

StarKist Samoa (NPDES Permit AS0000019)

Prepared By:

Steve Costa

Karen Glatzel

Date:

2 April 2007

Distribution:

Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

In November 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a mercury zone of mixing (ZOM).

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 7 November 2006 and 06:00 on 9 November 2006, samples of final effluent were collected from the SKS effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. At the same times eight grab samples were collected into laboratory supplied, pre-cleaned, 1 liter plastic bottles at each cannery (for copper and zinc ICP analysis). Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied bottles (for mercury analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS November 2006 samples (0.158 μ g/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 μ g/l) and similar to the averages of supplemental mercury testing conducted in previous analyses.
- There was little variability among the results from individual grab samples (standard deviation = $0.03 \,\mu g/l$) as shown in Table 1.
- All of the samples were above the recently revised ASWQS water quality standard criteria of $0.05 \, \mu g/l$, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 $\mu g/l$). The current NPDES Permit does <u>not</u> have a limitation for mercury.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports

³ Conducted in September 2004.

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS November 2006 samples was 3.25 μ g/l (Table 2).
- There was little variability among the copper results from the eight individual grab samples with the standard deviation (0.64 μ g/l) at about 20% of the mean with a range between 2.28 μ g/l and 4.32 μ g/l (Table 2).
- Five of the eight copper samples were above the ASWQS criterion⁴ of 3.1 μ g/l, although three samples were only slightly above the criterion. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μ g/l, and daily maximum of 108 μ g/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS November 2006 samples was 276 μ g/l (Table 3).
- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 61.7) with a range between 195 μ g/l and 368 μ g/l (Table 3).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show that ASWQS will be achieved within the zone of initial dilution.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

<u>Mercury:</u> Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS ($0.05\,\mu g/l$). The highest value recorded from the SKS November 2006 sampling was $0.158\,\mu g/l$. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies was $0.0232\,\mu g/l$.

The dilution required to reduce the effluent concentration to the ASWQS is 5.0:1 (Table 4). Such a dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the discharge based on previous dilution modeling done for the outfall diffuser.

<u>Copper:</u> A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 μ g/l) is calculated below (Table 4). The highest value of copper recorded from the SKS November 2006 sampling was 4.32 μ g/l. The maximum recorded receiving water copper concentration within Pago Pago Harbor, in the vicinity of the discharge, was 0.83 μ g/l.

The dilution required to reduce the effluent concentration to the ASWQS is 1.5:1. This dilution is well within the zone of initial dilution (ZID) and occurs within one meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 μ g/l) are provided below (Table 4). The highest value recorded from the SKS November 2006 sampling was 368 μ g/l. The maximum recorded receiving water zinc concentration within Pago Pago Harbor, in the vicinity of the discharge was 5.5 μ g/l.⁷

The dilution required to reduce the effluent concentration to the ASWQS is 4.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within about two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

SH	Table 1 SKS Effluent Flows and Mercury Concentrations 7 – 8 November 2006												
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)										
1	7 November 2006 09:00	2.03	0.080										
2	12:00	2.12	0.082										
3	15:00	2.22	0.150										
4	18:00	2.76	0.140										
5	21:00	2.59	0.106										
6	24:00	2.40	0.104										
7	8 November 2006 03:00	2.41	0.158										
8	06:00	2.60	0.115										
Minimum		2.03	0.080										
Average		2.35	0.113										
Maximum		2.76	0.158										
Standard Deviation		0.254	0.030										

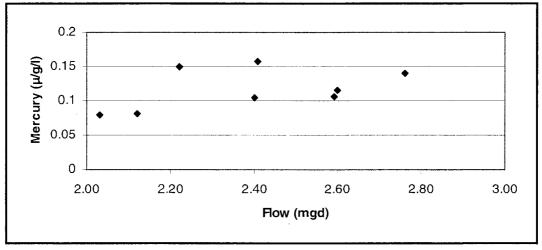


Figure 1. Scatter plot of SKS effluent flow rate and mercury concentration (Nov 2006)

S	Table 2 SKS Effluent Flows and Copper Concentrations 7 – 8 November 2006												
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations (μg/l)										
1	7 November 2006 09:00	2.03	2.92										
2	12:00	2.12	3.93										
3	15:00	2.22	4.32										
4	18:00	2.76	3.30										
5	21:00	2.59	3.14										
6	24:00	2.40	2.79										
7	8 November 2006 03:00	2.41	3.35										
8	06:00	2.60	2.28										
Minimum		2.03	2.28										
Average		2.35	3.25										
Maximum		2.76	4.32										
Standard Deviation		0.254	0.64										

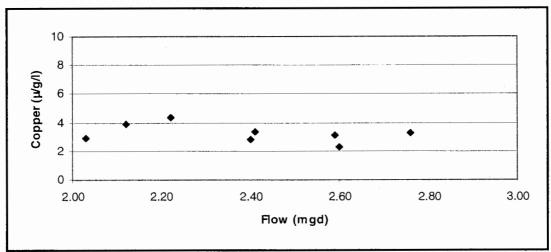


Figure 2. Scatter plot of SKS effluent flow rate and copper concentration (Nov 2006)

	Table SKS Effluent Flows and 7 – 8 Novem	Zinc Concentrat	ions
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (μg/l)
1	7 November 2006 09:00	2.03	200
2	12:00	2.12	272
3	15:00	2.22	368
4	18:00	2.76	322
5	21:00	2.59	329
6	24:00	2.40	246
7	8 November 2006 03:00	2.41	278
8	06:00	2.60	195
Minimum		2.03	195
Average		2.35	276
Maximum		2.76	368
Standard Deviation		0.254	61.7

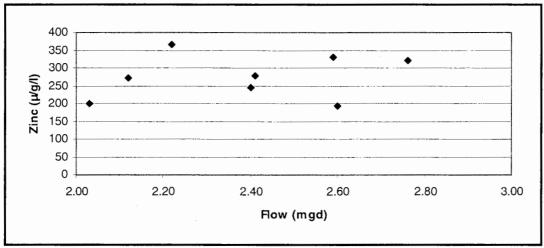


Figure 3.
Scatter plot of SKS effluent flow rate and zinc concentration (Nov 2006)

Table 4. Calculations of Required Dilution

Calculation of Required Dilution for Mercury

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/l

 $C_S = ASWQS = 0.05 \,\mu g/l$

For $C_E = 0.158 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.158 - 0.0232}{0.05 - 0.0232} = 5.03$$

Calculation of Required Dilution for Copper

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.83 μ g/l

 $C_S = ASWQS = 3.1 \,\mu g/1$

For $C_E = 4.32 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.32 - 0.83}{3.1 - 0.83} = 1.54$$

Calculation of Required Dilution for Zinc

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 5.5 μ g/l

 $C_S = ASWQS = 81 \mu g/1$

For $C_E = 368 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{368 - 5.5}{81 - 5.5} = 4.80$$

ATTACHMENT I

Chain-of-Custody

	Columbia Analytical Services NC.

CHAIN OF CUSTODY

SH#: ////	610033	
05 1 -000		_

An Employee - Owned Company	10	317 South 13	h Ave. • Kel	lso, WA 9	8626 •	(360)	577-72	22 • ((800) 6	95-722	22x07	• FAX	(360)	636-10	68	Р	AGE	1	'	OF _	1		CO	C .#		
PROJECT NAME STARKS	ST SA	MOA EI	TWE	HT M	CHIR	2H/	;- /		7	1	./	7	7	7	10	7	/ /	7	\neg		/ /	1	/	/ /	T	4
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required						*IND	ICATE	STA	TE HY	/DRO	CARB	ON P	ROCE	DURE	: Ar	C CA	WI	NOR	THWE	EST	OTHE	R:		_(CIR	CLE ONE)	
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ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

CH2M Hill

11/15/06

Service Request No.:

K0610033

Project: Date Received: Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 11/15/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

00006

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Analytical Report

Client:

CH2M Hill

Service Request: K0610033

Project: Sample Matrix: Starkist Samoa Effluent Monitoring/147323.JC.06.TW Water Date Collected: 11/7/06
Date Received: 11/15/06

Mercury, Total

Prep Method:

METHOD 1631E Units: ng/L Basis: NA

Analysis Method:

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0610033-001	5.0	0.35	5	11/15/06	12/11/06	80.2	
SKS-2	K0610033-002	5.0	0.35	5	11/15/06	12/11/06	82.0	
SKS-3	K0610033-003	5.0	0.35	5	11/15/06	12/11/06	150	
SKS-4	K0610033-004	5.0	0.35	5	11/15/06	12/11/06	140	
SKS-5	K0610033-005	5.0	0.35	5	11/15/06	12/11/06	106	
SKS-6	K0610033-006	5.0	0.35	5	11/15/06	12/11/06	104	
SKS-7	K0610033-007	5.0	0.35	5	11/15/06	12/11/06	158	
SKS-8	K0610033-008	5.0	0.35	5	11/15/06	12/11/06	115	
Method Blank 1	K0610033-MB1	1.0	0.07	1	11/30/06	12/11/06	ND	
Method Blank 2	K0610033-MB2	1.0	0.07	1	11/15/06	12/11/06	ND	
Method Blank 3	K0610033-MB3	1.0	0.07	1	11/15/06	12/11/06	ND	

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project: Sample Matrix: Starkist Samoa Effluent Monitoring/147323.JC.06.TW Water

Date Collected: 11/7/06

Date Received: 11/15/06

Date Extracted: 11/15/06

Date Analyzed: 12/11/06

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

SKS-3

K0610033-003S,

K0610033-003SD

Units: ng/L

Basis: NA

Lab Code: Test Notes:

									rer	cent	Recovery		
											CAS	Relative	
	Prep	Analysis		Spike	Level	Sample	Spike	Result			Acceptance	Percent	Result.
Analyte	Method	Method	MRL	MS	DMS	Result	MS	DMS	MS	DMS	Limits	Difference	Notes
Mercury	METHOD	1631E	5.0	250	250	150	354	351	82	80	71-125	<1	

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA

LCS Matrix: Water Date Received: NA

Date Extracted: 11/15/06

Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Prep Analysis True Percent Acceptance Result Limits Notes Analyte Method Method Value Result Recovery Mercury METHOD 1631E 5.00 4.16 83 77-123

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA
Date Received: NA

LCS Matrix:

Water

Date Extracted: 11/15/06

Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Prep Analysis True Percent Acceptance Result Analyte Method Method Value Result Recovery Limits Notes 77-123 METHOD 1631E 5.00 4.24 85 Mercury

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA

LCS Matrix:

Water

Date Received: NA

Date Analyzed: 12/11/06

Date Extracted: 11/15/06

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Percent Acceptance Result Prep Analysis True Method Method Value Recovery Limits Notes Analyte Result Мегсигу **METHOD** 1631E 5.00 4.22 84 77-123

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0610033-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.92		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	200		

0.0 % Solids:

METALS

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0610033-002

Analyte	Analysis Method	MRL	WDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.93		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	272		

% Solids: 0.0

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0610033-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	4.32		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	368		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0610033-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.30		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	322		

0.0 % Solids:

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0610033-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.14		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	329		

% Solids: 0.0

METALS

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0610033-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.79		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	246		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0610033-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.35		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	278		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0610033-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.28		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	195		

% Solids: 0.0

Comments:

00046

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected:

Project Name: Starkist Samoa Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0610033-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	0.01	В	
Zinc	200.8	1.00	0.04	1	11/21/06	11/22/06	0.06	В	

0.0 % Solids:

Comments:

00047

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source: Inorganic Ventures

CCV Source: Various

	Initial	Calibratio	n		Continui	ng Calib	ration		
Analyte	True	Found	%R(1)	True	True Found %R(1) Found %R(%R (1)	Method	
Copper	12.5	12.4	99	25.0	25.2	101	24.5	98	200.8
Zinc	25.0	24.7	99	25.0	25.1	100	24.9	100	200.8

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

	Initial	L Calibrat	ion		Continui				
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	25.0	100	25.3	101	200.8
Zinc				25.0	24.9	100	25.1	100	200.8

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

	Initia	l Calibrat	ion		Continui				
Analyte	True	Found	%R(1)	True Found		%R(1) Found		%R(1)	Method
Copper				25.0	25.7	103			200.8
Zinc				25.0	25.5	102			200.8

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

	CRDL Sta	ındard for AA		CRDL Standard for ICP Initial Final				
Analyte	True	Found	%R	True	Found	%R	Found	%R
Copper	1			1.0	1.03	103		
Zinc				5.0	5.17	103		

Columbia Analytical Services

METALS -3-BLANKS

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name:

Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)				uing Calil ank (ug/L)		ation	Preparation Blank	Method	
Analyte	(49/1)	С	1	С	2 (С	3	c	С	
Copper	0.05	U	0.05	U	0.05	J	0.05	U		 200.8
Zinc	0.20	Ū	0.20	Ū	0.20	J	0.20	U		200.8

Columbia Analytical Services

METALS - 3 -BLANKS

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name:

Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

Analyte	Initial Calib. Blank (ug/L)			Bla	ing Cal nk (ug/	L)		Preparation Blank		Method	
Analyce		С	1	C	2	С	3	С	С		
Copper			0.05	U	0.05	บ					200.8
Zinc			0.20	ט	0.20	U				Ī	200.8

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING - STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For:

StarKist Samoa (NPDES Permit AS0000019)

Prepared By:

Steve Costa

Karen Glatzel

Date:

24 April 2006

Distribution:

Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered high rate diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a zone of mixing (ZOM) based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a ZOM for mercury.

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data are reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING - STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

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¹ Submitted to USEPA in July 2005.

results reported here are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOPs) that were previously developed and approved by the USEPA and the American Samoa Environmental Protection Agency (ASEPA) for cannery effluent sampling. Between 09:00 on 28 February 2006 and 06:00 on 01 March 2006, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each cannery. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied mercury and ICP metals (for copper and zinc) sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS March 2006 samples (0.126 μ g/l; Table 1) is less than half the value reported in the priority pollutant scan³ (0.27 μ g/l) and close to the average of supplemental mercury testing conducted in August 2005 (0.117 μ g/l).
- There was some variability among the results from individual grab samples (standard deviation = $0.072 \,\mu g/l$), primarily because of one value of $0.298 \,\mu g/l$ that is approximately three timed higher than other values (Table 1).
- All of the samples were above the recently revised ASWQS water quality standard criterion of 0.05 μ g/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 μ g/l). The current NPDES Permit does not have a limitation for mercury.

 $^{^2}$ Results of the SKS metals analyses and the bioassay testing are presented in separate Technical Memorandums.

³ Conducted in September 2004.

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS March 2006 samples was $3.120 \,\mu g/l$ (Table 2).
- There was noticeable variability among the results from the eight individual copper grab samples (standard deviation = 0.996 μ g/l) with a range between 1.79 μ g/l and 4.83 μ g/l (Table 2).
- Four out of eight copper samples were below the ASWQS criterion⁴ of 3.1 μg/l, three copper samples were measured near 3.6 μg/l. One sample (Grab 8) was measured at 4.830 μg/l, still well below the NPDES permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent copper concentration as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the March 2006 samples was 237 μg/1 (Table 3).
- There was a noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 60) with a range between 146 μ g/l and 340 μ g/l (Table 3).
- All of the eight zinc samples were above the ASWQS criterion⁵ of 81 μg/l. All values were well below the current NPDES Permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to shows ASWQS will be achieved within the zone of initial dilution.

<u>Mercury:</u> Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 μ g/l). The highest value recorded from the March 2006 sampling was 0.298 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 0.0232 μ g/l.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

The dilution required to reduce the effluent concentration to the ASWQS is less than 10.3:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser.

<u>Copper:</u> A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 μ g/l) is calculated below. The highest value of copper recorded from the March 2006 sampling was 4.830 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge was 0.83 μ g/l6.

The dilution required to reduce the effluent concentration to the ASWQS is less than 1.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within a meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 μ g/l), are provided below. The highest value recorded from the March 2006 sampling was 340 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 5.5 μ g/l7.

The dilution required to reduce the effluent concentration to the ASWQS is less than 4.4:1. This dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured excluding outliers greater than three standard deviations from the mean.

Table 1										
StarKist Samoa Effluent Flows and Mercury Concentrations										
28 February - 1 March 2006										

Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)
1	28 Feb 2006 09:00	1.98	0.107
2	12:00	2.63	0.083
3	15:00	2.60	0.298
4	18:00	1.94	0.088
5	21:00	1.95	0.096
6	24:00	2.16	0.092
7	1 March 2006 03:00	2.53	0.102
8	06:00	2.15	0.145
Minimum		1.94	0.083
Average		2.24	0.126
Maximum		2.63	0.298
Standard Deviation		0.30	0.072

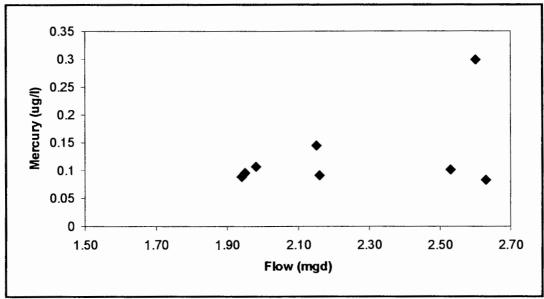


Figure 1. Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Table 2
StarKist Samoa Effluent Flows and Copper Concentrations
28 February - 1 March 2006

Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations (µg/l)
1	28 Feb 2006 09:00	1.98	3.630
2	12:00	2.63	2.820
3	15:00	2.60	2.170
4	18:00	1.94	3.610
5	21:00	1.95	3.670
6	24:00	2.16	2.440
7	1 March 2006 03:00	2.53	1.790
8	06:00	2.15	4.830
Minimum		1.94	1.790
Average		2.24	3.120
Maximum		2.63	4.830
Standard Deviation		0.30	0.996

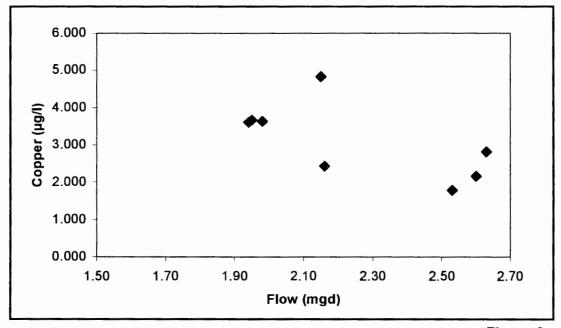
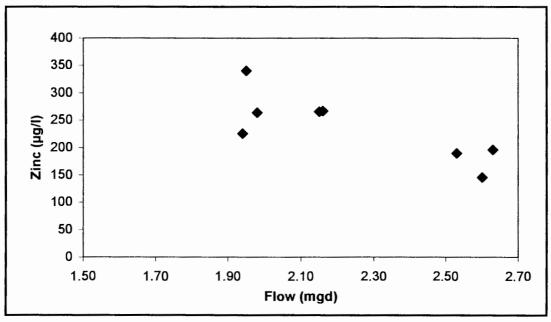


Figure 2. Scatter plot of StarKist Samoa effluent flow rate and copper concentration

Stark	Table 3 StarKist Samoa Effluent Flows and Zinc Concentrations 28 February - 1 March 2006												
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (µg/l)										
1	28 Feb 2006 09:00	1.98	264										
2	12:00	2.63	196										
3	15:00	2.60	146										
4	18:00	1.94	226										
5	21:00	1.95	340										
6	24:00	2.16	267										
7	1 March 2006 03:00	2.53	190										
8	06:00	2.15	266										
Minimum		1.94	146										
Average		2.24	237										
Maximum		2.63	340										

Standard

Deviation



0.30

60

Figure 3. Scatter plot of StarKist Samoa effluent flow rate and zinc concentration

Table 4. Calculations of Required Dilution

Calculation of Required Dilution for Mercury

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/1

 C_S = proposed ASWQS = 0.05 μ g/1

For $C_E = 0.298 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.298 - 0.0232}{0.05 - 0.0232} = 10.3$$

Calculation of Required Dilution for Copper

D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.83 μ g/l

 $C_S = ASWQS = 3.1 \,\mu g/1$

For $C_E = 4.830 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.830 - 0.83}{3.1 - 0.83} = 1.8$$

Calculation of Required Dilution for Zinc

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 5.5 μ g/l

 $C_S = ASWQS = 81 \mu g/l$

For $C_E = 340 \, \mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{340 - 5.5}{81 - 5.5} = 4.4$$

ATTACHMENT I Chain-of-Custody

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ATTACHMENT II

Columbia Analytical Systems Laboratory Report



March 16, 2006

Service Request No: K0601753

Steve Costa CH2M Hill 216 Driftwood Lane P.O. Box 1238 Trinidad, CA 95570-1238

RE: Joint Cannery Effluent Monitoring/147323.JC.06.NT

Dear Steve:

Enclosed are the results of the sample(s) submitted to our laboratory on March 06, 2006. For your reference, these analyses have been assigned our service request number K0601753.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Project Chemis

HJ/jm

Page I of

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct earbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Client:

CH2M Hill

Service Request No.:

K0601753

Project:

Joint Cannery Effluent Monitoring / 147323.JC.06.NT

Date Received:

3/6/06

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory; Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/6/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by	Date	3/20/06	00005

Analytical Report

Client:

CH2M Hill

Service Request: K0601753

Project:

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Date Collected: 3/1/06

Sample Matrix:

Water

Date Received: 3/6/06

Mercury, Total

Prep Method:

METHOD

Units: ng/L

Analysis Method:

1631E

Basis: NA

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0601753-001	5.0	0.5	5	3/7/06	3/13/06	107	
SKS-2	K0601753-002	5.0	0.5	5	3/7/06	3/13/06	82.6	
SKS-3	K0601753-003	5.0	0.5	5	3/7/06	3/13/06	298	
SKS-4	K0601753-004	5.0	0.5	5	3/7/06	3/13/06	87.5	
SKS-5	K0601753-005	5.0	0.5	5	3/7/06	3/13/06	95.9	
SKS-6	K0601753-006	5.0	0.5	5	3/7/06	3/13/06	92.3	
SKS-7	K0601753-007	5.0	0.5	5	3/7/06	3/13/06	102	
SKS-8	K0601753-008	5.0	0.5	5	3/7/06	3/13/06	145	
Method Blank 1	K0601753-MB1	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 2	K0601753-MB2	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 3	K0601753-MB3	1.0	0.1	1	3/7/06	3/13/06	ND	

QA/QC Report

Client:

CH2M Hill

Project: Sample Matrix: Joint Cannery Effluent Monitoring/147323.JC.06.NT

Water

Service Request: K0601753

Date Collected: NA Date Received: NA

Date Extracted: 3/7/06 Date Analyzed: 3/13/06

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

Batch QC

Lab Code:

K0601634-001S,

K0601634-001SD

Units: ng/L

Basis: NA

Test Notes:

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL	Spike MS	Level DMS	Sample Result	Spike MS		MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Мегсигу	METHOD	1631E	1.0	25	25	17.4	46.4	44.6	116	109	71-125	4	

QA/QC Report

Client:

CH2M Hill

Service Request: K0601753

Project:

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA Date Extracted: 3/7/06

Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

5.35

107

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Result

Notes

Test Notes:

CAS Percent Recovery Prep Analysis Percent True Acceptance Analyte Method Method Value Result Recovery Limits METHOD Mercury 1631E 5.00 77-123

QA/QC Report

Client:

CH2M Hill

Service Request: K0601753

Project:

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA
Date Extracted: 3/7/06

Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Prep Analysis True Percent Acceptance Result Analyte Method Method Value Result Recovery Limits Notes 77-123 Мегсигу METHOD 1631E 5.00 5.45 109

QA/QC Report

Client:

CH2M Hill

Service Request: K0601753

Project:

Joint Cannery Effluent Monitoring/147323.JC.06.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA Date Extracted: 3/7/06

Date Analyzed: 3/13/06

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Lab Code:

K0601753-QCS

Basis: NA

Test Notes:

CAS Percent Recovery Analysis Acceptance Prep True Percent Result Analyte Method Method Value Result Recovery Limits Notes 1631E 77-123 Mercury METHOD 5.00 5.30 106

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Matrix:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Units: µG/L

Basis: NA

Sample Name: SKS-1

WATER

Lab Code: K0601753-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.630		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	264		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Units: µG/L

Basis: NA

Matrix:

WATER

Sample Name: SKS-2

Lab Code: K0601753-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.820		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	196		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0601753-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.170		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	146		

% Solids: 0.0

Comments:

00038

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

Units: µG/L

WATER

Basis: NA

Sample Name: SKS-4

Lab Code: K0601753-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.610		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	226		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0601753-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.670		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	340		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0601753-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.440	ĺ	
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	267	\Box	

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0601753-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	1.790		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	190		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Date Received: 03/06/06

Project Name: Joint Cannery Effluent Monitoring

Units: µG/L

Basis: NA

Matrix:

WATER

Sample Name: SKS-8

Lab Code: K0601753-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	4.830		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	266		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected:

Project Name: Joint Cannery Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0601753-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.100	0.005	1	3/10/06	3/14/06	0.005	ן ט	
Zinc	200.8	0.50	0.02	1	3/10/06	3/14/06	0.02	В	

% Solids: 0.0

Comments:

00044

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/I

	Initial	Calibrat	ion		Continu	ing Cal	ibration		
Analyte	True Found %R(1)		True Found %R(1) Found %R(1					Method	
Copper	12.5	12.4	99	25.0	25.7	103	25.0	100	200.8
Zinc	25.0	25.1	100	25.0	25.3	101	24.8	99	200.8

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICV Source:

CCV Source: Various

Concentration Units: ug/I

	Initial	Calibra	tion		Continu	ing Cal	ibration		
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	25.1	100			200.8
Zinc				25.0	24.9	100			200.8

METALS - 2b -CRDL STANDARD FOR AA AND ICP

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Concentration Units: ug/I

	CRDL	Standard for AA	Init	CRDL Stand	ard for	or ICP Final			
Analyte	True	Found %R	True	Found	%R Found %R				
Copper			1.0	1.01	101				
Zinc			5.0	4.57	91		1		

METALS - 3 -**BLANKS**

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Preparation Blank Matrix (soil/water): WATER Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	С			uing Ca ank (ug 2		bration) 3	С	Preparation Blank C	Method
Copper	0.050	٦	0.050	ם	0.05	U	0.050	U		200.8
Zinc	0.20	U	0.20	U	0.20	U	0.20	U		200.8

-7-

LABORATORY CONTROL SAMPLE

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

	Aqueous ug/L				Soli	d (mg	g/kg)	
Analyte	True	Found	&R	True	Found	С	Limits	&R
Copper	2.00	1.94	97			TI		
Zinc	2.00	1.92	96			T		

-7-

LABORATORY CONTROL SAMPLE

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

	Aqueous ug/L			Solid (mg/kg)				
Analyte	True	Found	&R	True	Found	С	Limits	8R
Copper	2.00	2.00	100					
Zinc	2.00	1.94	97					

-10-

METHOD DETECTION LIMITS

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monito

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back- ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.000	0.050	200.8
Zinc	66		5.00	0.20	200.8

Comments				

-12-

ICP LINEAR RANGES (QUARTERLY)

Client:

CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monite

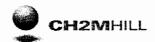
ICP ID Number:

Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	500.0	200.8
Zinc	15.00	500.0	200.8

Comments:	_
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TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING — STARKIST SAMOA NOVEMBER 2006 SAMPLING

Prepared For:

StarKist Samoa (NPDES Permit AS0000019)

Prepared By:

Steve Costa

Karen Glatzel

Date:

2 April 2007

Distribution:

Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

Purpose

In November 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a mercury zone of mixing (ZOM).

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 7 November 2006 and 06:00 on 9 November 2006, samples of final effluent were collected from the SKS effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. At the same times eight grab samples were collected into laboratory supplied, pre-cleaned, 1 liter plastic bottles at each cannery (for copper and zinc ICP analysis). Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied bottles (for mercury analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS November 2006 samples (0.158 μg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 μg/l) and similar to the averages of supplemental mercury testing conducted in previous analyses.
- There was little variability among the results from individual grab samples (standard deviation = $0.03 \,\mu\text{g/l}$) as shown in Table 1.
- All of the samples were above the recently revised ASWQS water quality standard criteria of $0.05 \, \mu g/l$, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 $\,\mu g/l$). The current NPDES Permit does <u>not</u> have a limitation for mercury.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports

³ Conducted in September 2004.

• There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS November 2006 samples was 3.25 μ g/l (Table 2).
- There was little variability among the copper results from the eight individual grab samples with the standard deviation (0.64 μ g/l) at about 20% of the mean with a range between 2.28 μ g/l and 4.32 μ g/l (Table 2).
- Five of the eight copper samples were above the ASWQS criterion⁴ of 3.1 μ g/l, although three samples were only slightly above the criterion. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μ g/l, and daily maximum of 108 μ g/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS November 2006 samples was 276 μ g/l (Table 3).
- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 61.7) with a range between 195 μ g/l and 368 μ g/l (Table 3).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show that ASWQS will be achieved within the zone of initial dilution.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Mercury: Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 μ g/l). The highest value recorded from the SKS November 2006 sampling was 0.158 μ g/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies was 0.0232 μ g/l.

The dilution required to reduce the effluent concentration to the ASWQS is 5.0:1 (Table 4). Such a dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the discharge based on previous dilution modeling done for the outfall diffuser.

<u>Copper:</u> A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 μ g/l) is calculated below (Table 4). The highest value of copper recorded from the SKS November 2006 sampling was 4.32 μ g/l. The maximum recorded receiving water copper concentration within Pago Pago Harbor, in the vicinity of the discharge, was 0.83 μ g/l. ⁶

The dilution required to reduce the effluent concentration to the ASWQS is 1.5:1. This dilution is well within the zone of initial dilution (ZID) and occurs within one meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 μ g/l) are provided below (Table 4). The highest value recorded from the SKS November 2006 sampling was 368 μ g/l. The maximum recorded receiving water zinc concentration within Pago Pago Harbor, in the vicinity of the discharge was 5.5 μ g/l.⁷

The dilution required to reduce the effluent concentration to the ASWQS is 4.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within about two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

Table 1 SKS Effluent Flows and Mercury Concentrations 7 – 8 November 2006									
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (μg/l)						
1	7 November 2006 09:00	2.03	0.080						
2	12:00	2.12	0.082						
3	15:00	2.22	0.150						
4	18:00	2.76	0.140						
5	21:00	2.59	0.106						
6	24:00	2.40	0.104						
7	8 November 2006 03:00	2.41	0.158						
8	06:00	2.60	0.115						
Minimum		2.03	0.080						
Average		2.35	0.113						
Maximum		2.76	0.158						
Standard Deviation		0.254	0.030						

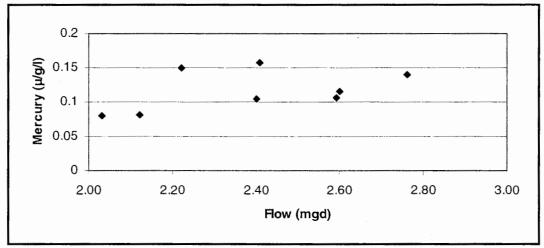


Figure 1. Scatter plot of SKS effluent flow rate and mercury concentration (Nov 2006)

Table 2 SKS Effluent Flows and Copper Concentrations 7 – 8 November 2006								
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations (μg/l)					
1	7 November 2006 09:00	2.03	2.92					
2	12:00	2.12	3.93					
3	15:00	2.22	4.32					
4	18:00	2.76	3.30					
5	21:00	2.59	3.14					
6	24:00	2.40	2.79					
7	8 November 2006 03:00	2.41	3.35					
8	06:00	2.60	2.28					
Minimum		2.03	2.28					
Average		2.35	3.25					
Maximum		2.76	4.32					
Standard Deviation		0.254	0.64					

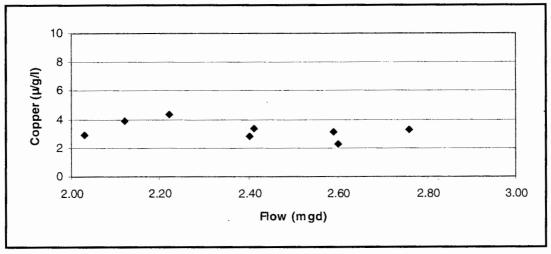


Figure 2. Scatter plot of SKS effluent flow rate and copper concentration (Nov 2006)

Table 3 SKS Effluent Flows and Zinc Concentrations 7 – 8 November 2006								
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (μg/l)					
1	7 November 2006 09:00	2.03	200					
2	12:00	2.12	272					
3	15:00	2.22	368					
4	18:00	2.76	322					
5	21:00	2.59	329					
6	24:00	2.40	246					
7	8 November 2006 03:00	2.41	278					
8	06:00	2.60	195					
Minimum		2.03	195					
Average		2.35	276					
Maximum		2.76	368					
Standard Deviation		0.254	61.7					

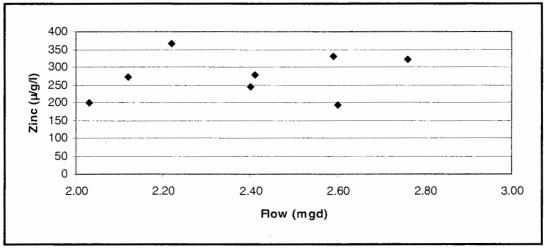


Figure 3. Scatter plot of SKS effluent flow rate and zinc concentration (Nov 2006)

Table 4. Calculations of Required Dilution

Calculation of Required Dilution for Mercury

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.0232 μ g/l

 $C_S = ASWQS = 0.05 \,\mu g/l$

For $C_E = 0.158 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.158 - 0.0232}{0.05 - 0.0232} = 5.03$$

Calculation of Required Dilution for Copper

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 0.83 μ g/l

 $C_S = ASWQS = 3.1 \,\mu g/1$

For $C_E = 4.32 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.32 - 0.83}{3.1 - 0.83} = 1.54$$

Calculation of Required Dilution for Zinc

 D_R = dilution required to meet ASWQS

 C_E = effluent concentration

 C_A = receiving water ambient concentration = 5.5 μ g/l

 $C_S = ASWQS = 81 \mu g/1$

For $C_E = 368 \,\mu g/l$:

$$D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{368 - 5.5}{81 - 5.5} = 4.80$$

ATTACHMENT I Chain-of-Custody

	Ana	mbia alytical rvices ^{INC.}

CHAIN OF CUSTODY

	SR#:	40610033	
1	05 1	000 "	~

An Employee - Owned Company	13	17 South 13t	h Ave. • Kels	so, WA 98	3626 •	(360) 5	77-722	2 • (8	300) 6	95-722	2x07	FAX	(360) 6	36-10	68	Ρ.	AGE		•	OF.			COC	D.#		
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PROJECT NUMBER 14732	23.JC	. CONT	ジ			7	/	-/		\ \frac{1}{2}	'/	′ /	0/	/	81514	/		/	/	à/	. /	129	' /	/	/ /	000
PROJECT MANAGER STEVE	= Co	STA				7.	/	Sin		BTEX	/	13	15/	/	18/	/	/	/,	/\{		3 /	206	/		/ /	1
COMPANY ADDRESS CH2M	HIL					CONTAINERS	/1	3270 Janics by GC/MS	i/i	Fire Fine Sel Delow)		1664 8.0	Pesticides/H2 Congene		Q/ ~ (DIMIS DO	P	1 6	NH 3-N 500 1554 PO 100 100 100 100 100 100 100 100 100 10	Ž (C)	40x 1650 C	3/			/ /	
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SKS-2	(1	2											×										
5KS-3					2											X										
SK5-4					2											メ			7							
5KS-5					Z											X										
SKS-6					2											×										\neg
5KS-7					2											X										\neg
SKS-8	1				2											X										
,																									•	
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II. Report Dup., MS	MSD as					*INDI	CATE	STAT	EHY	/DRO	CARB	ON PI	ROCE	DURE	: AK	CA	WI	NO	NHTF	EST	ОТН	ER:		_ (CIP	CLE ONE)	
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Printed Name	Firm		Printe	ed Name	<u> </u>	F	irm	17		-	Prin	nted N	lame		Fi	rm	-			Printe	ed Nar	me		Firm		-

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

CH2M Hill

Service Request No.:

K0610033

Project: Date Received: Starkist Samoa Effluent Monitoring/147323.JC.06.TW

11/15/06 Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 11/15/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

Approved by

No anomalies associated with the analysis of these samples were observed.

Date 12/4/06

00006

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Analytical Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: 11/7/06

Sample Matrix:

Water

Date Received: 11/15/06

Mercury, Total

Prep Method:

METHOD

Units: ng/L Basis: NA

Analysis Method: 1631E

Test Notes:

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0610033-001	5.0	0.35	5	11/15/06	12/11/06	80.2	
SKS-2	K0610033-002	5.0	0.35	5	11/15/06	12/11/06	82.0	
SKS-3	K0610033-003	5.0	0.35	5	11/15/06	12/11/06	150	
SKS-4	K0610033-004	5.0	0.35	5	11/15/06	12/11/06	140	
SKS-5	K0610033-005	5.0	0.35	5	11/15/06	12/11/06	106	
SKS-6	K0610033-006	5.0	0.35	5	11/15/06	12/11/06	104	
SKS-7	K0610033-007	5.0	0.35	5	11/15/06	12/11/06	158	
SKS-8	K0610033-008	5.0	0.35	5	11/15/06	12/11/06	115	
Method Blank 1	K0610033-MB1	1.0	0.07	1	11/30/06	12/11/06	ND	
Method Blank 2	K0610033-MB2	1.0	0.07	1	11/15/06	12/11/06	ND	
Method Blank 3	K0610033-MB3	1.0	0.07	1	11/15/06	12/11/06	ND	

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project: Sample Matrix: Starkist Samoa Effluent Monitoring/147323.JC.06.TW Water

Date Collected: 11/7/06

Date Extracted: 11/15/06

Date Received: 11/15/06

Date Analyzed: 12/11/06

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

K0610033-003SD

Sample Name:

SKS-3

K0610033-003S,

Units: ng/L

Basis: NA

Lab Code: Test Notes:

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL	•		Sample Result	Spike MS	Result DMS	MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	5.0	250	250	150	354	351	82	80	71-125	<1	

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA
Date Received: NA

LCS Matrix:

Water

Date Extracted: 11/15/06

Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.16	83	77-123	

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA

LCS Matrix:

Date Received: NA

Date Extracted: 11/15/06

Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

CAS

Percent Recovery Prep Analysis True Percent Acceptance Analyte Method Method Value Result Recovery Limits

Mercury

METHOD

5.00

85

Result Notes

1631E

4.24

77-123

QA/QC Report

Client:

CH2M Hill

Service Request: K0610033

Project:

Starkist Samoa Effluent Monitoring/147323.JC.06.TW

Date Collected: NA

Date Received: NA

LCS Matrix:

Water

Date Extracted: 11/15/06 Date Analyzed: 12/11/06

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L Basis: NA

True

Value

5.00

Test Notes:

CAS

Percent

Recovery Acceptance Result Percent Recovery Limits Notes

Analyte Mercury

METHOD

Prep

Method

Analysis

Method

Result

84

77-123

1631E

4.22

METALS

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Matrix:

WATER

Date Received: 11/15/06

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0610033-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.92		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	200		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0610033-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.93		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	272		

0.0 % Solids:

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0610033-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	4.32		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	368		

% Solids: 0.0

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0610033-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.30		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	322		

0.0 % Solids:

METALS

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0610033-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.14		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	329		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0610033-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.79		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	246		

0.0 % Solids:

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0610033-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.35		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	278		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0610033-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.28		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	195		

% Solids: 0.0

Comments:

00046

INORGANIC ANALYSIS DATA SHEET

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Date Collected:

Project Name: Starkist Samoa Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0610033-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	0.01	В	
Zinc	200.8	1.00	0.04	1	11/21/06	11/22/06	0.06	В	

0.0 % Solids:

Comments:

00047

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

	Initial	Calibratio	1	Continui						
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method	
Copper	12.5	12.4	99	25.0	25.2	101	24.5	98	200.8	
Zinc	25.0	24.7	99	25.0	25.1	100	24.9	100	200.8	

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

	Initia	Calibrat		Continui					
Analyte	True	Found	%R (1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	25.0	100	25.3	101	200.8
Zinc				25.0	24.9	100	25.1	100	200.8

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

	Initial Calibration				Continui					
Analyte	True	Found	%R (1)	True	Found	%R(1)	Found	%R (1)	Method	
Copper				25.0	25.7	103			200.8	
Zinc				25.0	25.5	102			200.8	

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client:

CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Concentration Units: ug/L

	CRDL Sta	undard for AA		Τ	CRDL Standard for ICP								
1					Init	ial		Final					
Analyte	True	Found	%R		True	Found	%R	Found	%R				
Copper				ĺΙ	1.0	1.03	103						
Zinc	1			П	5.0	5.17	103						

METALS -3-BLANKS

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name:

Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)				ing Cali nk (ug/L		ration ·	Preparation Blank	Method
Analyte	(49/11)	С	1	С	2	С	3 C	С	
Copper	0.05	U	0.05	U	0.05	U	0.05 ប		200.8
Zinc	0.20	Ū	0.20	ט	0.20	U	0.20 U	i	200.8

METALS -3-BLANKS

Client:

CH2M Hill

Service Request: K0610033

Project No.:

147323.JC.06.TW

Project Name:

Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)		Continuing Calibra Blank (ug/L)		ation		Preparation Blank		Method			
Analyte		С	1		С	2	C	3	С	С		
Copper		T	0.	05	ט	0.05	U					200.8
Zinc			0.	20	U	0.20	ט					200.8

EFFLUENT METALS TESTING — STARKIST SAMOA SEPTEMBER 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

9dC, P.O. Box 1238, Trinidad, CA 95570 707-677-0123 – gdcocn@earthlink.net

Date: 21 December 2007

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 tradewind season was done using eight (8) samples. A sample was collected every three hours for a 24 hr period September 4th and 5th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		3.69	1.01	3.87

Copper was below the American Samoa Water Quality Standards criterion for all samples, except one, where it is equal to the standard. Mercury exceeded the ASWQS criterion for four of the eight samples, and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In September 2007 metals analyses were conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and, after high strength waste segregation, the treated process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted zone of mixing (ZOM) for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined effluent discharge. Each effluent grab sample was analyzed for mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly, SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 4 September and 06:00 on 5 September 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. A total of eight grab samples were collected. A 1-gallon plastic cubitainer was filled at each sampling interval. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Table 1. Res	ults of Effluen	t Metals Testi	ng – Septembe	er 2007
Time	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
4 Sept 2007 - 09:00	1.17	0.0614	2.90	290
4 Sept 2007 - 12:00	1.33	0.0168	3.13	298
4 Sept 2007 - 15:00	1.39	0.0152	1.91	227
4 Sept 2007 - 18:00	1.28	0.0490	0.89	107
4 Sept 2007 - 21:00	1.22	0.0630	1.94	232
5 Sept 2007 - 00:00	1.28	0.0502	0.94	130
5 Sept 2007 - 03:00	1.17	0.0866	1.54	135
5 Sept 2007 - 06:00	1.27	0.1220	1.63	132
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Standard Deviation	0.076	0.0351	0.81	77.0

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS September 2007 samples (0.0580 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was noticeable, but relatively low, variability among the results from individual grab samples (standard deviation = $0.035 \,\mu\text{g/l}$) as shown in Table 1.
- Four of the eight of the samples were above the recently revised ASWQS water quality standard criteria of $0.05~\mu g/l$. One sample was equal to the criterion. The current NPDES Permit does <u>not</u> have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS September 2007 samples was 1.86 µg/l (Table 1). The average concentrations reported for this sampling period are generally less than those reported for previous analyses as described in the next section, and similar to the value reported in February 2007.
- There was noticeable, but relatively low, variability among the copper results from the eight individual grab samples with a standard deviation of 0.81 µg/l.

³ Conducted in September 2004.

- All of the samples had copper concentrations below or equal to the ASWQS criterion⁴ of 3.1 μ g/l (one sample was essentially the same as the criterion). The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μ g/l, and daily maximum of 108 μ g/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

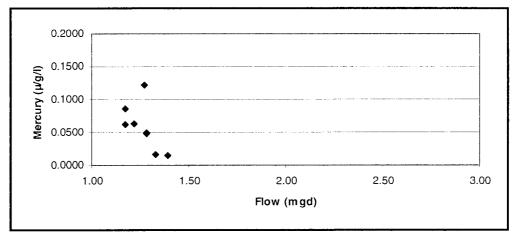


Figure 1. SKS effluent flow rate and mercury concentration (Sept 2007)

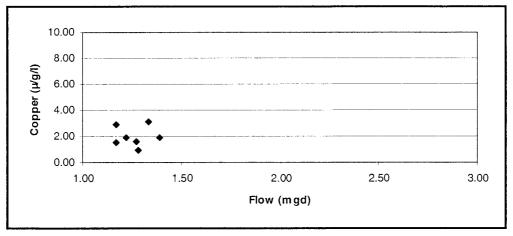


Figure 2. SKS effluent flow rate and copper concentration (Sept 2007)

The results of the sample testing for zinc indicate:

• The average zinc concentration for the SKS September 2007 samples was 194 μ g/l (Table 1). This concentration is less than the average values for previous analyses described in the next section and about the same as the result for the February 2007 sampling.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 77.0) with a range between 107 μ g/l and 298 μ g/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

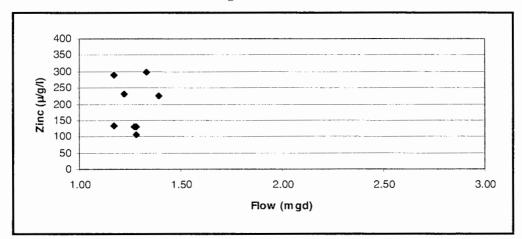


Figure 3. SKS effluent flow rate and zinc concentration (Sept 2007)

Comparison to Previous Tests

A summary of the semi-annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution (ZID). The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

 D_R = is the dilution required to reduce the concentration to the ASWQS

 C_E = the effluent concentration

 C_A = the maximum receiving water concentration

 C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

					s Testing R		
	and				SWQS Crit	CANADA STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET,	· · · · · · · · · · · · · · · · · · ·
Parame	eter	Mei	rcury	Co	pper	Z	inc
Water Quality	Criterion	0.05	5 μ g /l	3.1	μ g/l	81	μ g/l
Ambient M			32 μ g/ l		3 μ g/l		μ g/l
Sample	Flow	Conc.	Dilution	Conc.	Dilution	Conc.	Dilution
Date	(mgd)	(μ g/l)	Required	(μ g/l)	Required	(μ g/l)	Required
	2.44	0.0734	1.87			<u> </u>	
	3.05	0.109	3.20				
	3.02	0.101	2.90				
	2.39	0.122	3.69		1	***	
Aug 2005	2.55	0.177	5.74				· · · · · · · · · · · · · · · · · · ·
	2.8	0.153	4.84		1		
	2.03	0.112	3.31		1		
	2.14	0.0912	2.54	·····			<u> </u>
	1.98	0.107	3.13	3.63	1.23	264	3.42
	2.63	0.083	2.23	2.82	1	196	2.52
	2.6	0.298	10.25	2.17	1	146	1.86
	1.94	0.088	2.42	3.61	1.22	226	2.92
Feb 2006	1.95	0.096	2.72	3.67	1.25	340	4.43
	2.16	0.092	2.57	2.44	1	267	3.46
	2.53	0.102	2.94	1.79	1	190	2.44
	2.15	0.145	4.54	4.83	1.76	266	3.45
	2.03	0.0802	2.13	2.92	1	200	2.58
	2.12	0.0820	2.19	3.93	1.37	272	3.53
	2.22	0.150	4.73	4.32	1.54	368	4.80
	2.76	0.140	4.36	3.3	1.09	322	4.19
Nov 2006	2.59	0.106	3.09	3.14	1.02	329	4.28
	2.40	0.104	3.01	2.79	1	246	3.19
	2.41	0.158	5.03	3.35	1.11	278	3.61
	2.60	0.115	3.43	2.28	1	195	2.51
	2.20	0.0550	1.19	1.56	1	169	2.17
	2.02	0.0586	1.32	2.31	1	296	3.85
	2.06	0.0676	1.66	2.02	1	178	2.28
	2.50	0.0501	1.00	1.43	1 1	142	1.81
Feb 2007	2.48	0.0704	1.76	2.16	1	196	2.52
	1.76	0.0427	1	1.81	1 1	166	2.13
	2.16	0.0825	2.21	2.98	1 1	222	2.87
	2.15	0.0810	2.16	2.13	1 1	159	2.03
	1.17	0.0614	1.43	2.90	1 1	290	3.77
	1.33	0.0168	1	3.13	1.01	298	3.87
	1.39	0.0152	1	1.91	1	227	2.93
	1.28	0.0490	1	0.89	1 1	107	1.34
Sep 2007	1.22	0.0630	1.49	1.94	1 1	232	3.00
	1.28	0.0502	1.01	0.94	1	130	1.65
	1.17	0.0866	2.37	1.54	1	135	1.72
	1.27	0.1220	3.69	1.63	1	132	1.68
Minimum	1.17	0.0152	1.00	0.89	1.00	107	1.34
Average	2.12	0.0152	2.80	2.57	1.08	225	2.90
Maximum	3.05	0.0964	10.25	4.83	1.76	368	4.80
				WEIGHT COMPANY	required is shown		4.00

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:16. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **9dc**, 28 June 2007

ATTACHMENT I

Chain-of-Custody

					OHAMIN	01 00	01001					IVV	00900
PROJECT:	StarKist Efflu	uent Mor	itoring - Sh	(S0702.TW									
FROM:	Karen Glatze												
	P.O. Box 123		dad, CA, 9	5570-1238				707-677-012	3	gdcoc	n@ea	athlink.	net
TO:	Harvey Jack	v. Colum	bia Analyti	cal Services									
	1317 South												
	1317 30001	TourAve	, Keiso, VV				ΔΝΙΔΙ	360-577-722 YSIS REQUES					
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	Total-P	NH3-N		TKN (AmTest)		Cu	Zn	Hg	COMMENTS
SKS-1	9/5/2007		Water	2	Total	14110-14	110011102	Trat (runness)	Officrophysica .	X	X	X	
SKS-2	9/5/2007	-	Water	2						X	X	X	1
SKS-3	9/5/2007		Water	2						X	X	X	1
SKS-4	9/5/2007	 	Water	2			 			X	X	X	1
SKS-5	9/5/2007	<u> </u>	Water	2			<u> </u>			X	X	X	Total metals
SKS-6	9/5/2007		Water	2						X	X	X	1
SKS-7	9/5/2007		Water	2						X	X	X	1
SKS-8	9/5/2007		Water	2						X	X	X	
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SAMPLED B	: K. Glatzel	1	As	DATE/TIME:	9/5/	2007	SPECIAL	NSTRUCTIONS	S/REMARKS:			-	
SHIPPED VIA	PPED VIA: DHL DATE/TIME:				9/6/	2007	Note: Sam	ple may be as n	nuch as 40% se	awate	r		
RELINQUISHED BY: S.Costa DATE/TIME:					2007	Report Dup, MS, MSD as required							
RECEIVED E		Askar	<u>'</u>	DATE/TIME:	1/18/17	1030							
RELINQUISH	ED BY:			DATE/TIME:]						
RECEIVED E	Y:			DATE/TIME:									

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918903636 JOE CARNEY	4 Shipment Details	7841699736	Non-Dutiable	. EQ
Shipper's Reference (up to 35 characters) - NPDES - RW- CDC (UT-TW)	Total Number Total Weight of Packages If DHL Express Document	26	Service Options	Other
Company Name	packaging used, enter		Saturday Delivery	L_J Pickup
SMEKINT SAMUA	9 266	ibs@ x x	Other	Delivery Notification or service options are
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KELSO, WA	Destination Duties/Taxes If left blank, Rec	eiver pays duties/taxes.	PAYMENT DETA	AILS (Check, Card No.)
	The commodities, technology or software to	Specify approved account number be exported from the U.S. are in compliance with the sion to countries contrary to U.S. law prohibited.	Туре	Expires
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L USH	damage to U.S. \$100. The Warsaw Conveil to complete other documents necessary to	ly to this shipment and limit DHL's liability for loss or ntion may also apply (see reverse). I/we authorize DHL o export this shipment. I/we understand that Shipment	PICKED UP BY	126.
Post/ZIP Code (required) Phone, Fax, or E-mail (required) 360-577-7222	Value Protection is available on request, for recipient or 3rd party refuses to pay. I/we u	or an extra charge, I/we agree to pay all charges if the inderstand that DHL DOES NOT TRANSPORT CASH.	Route No.	29/10
10020 300-074-7222	Signature (required)	Date / /	Time 1	Date 110 17

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

Glatzel da Costa, gdc

Service Request No.:

K0708430

Project:

Starkist Effluent Monitoring / SKS0702.TW

Date Received:

09/18/07

Sample Matrix:

Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 09/18/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

Approved by

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

H	_Date	10/3/67
		/ /

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-1

Lab Code:

K0708430-001

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	2.90		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	290		

% Solids:

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received:

9/18/07

Matrix:

WATER

Units: ug/L

> Basis: N/A

Sample Name:

SKS-2

0.0

Lab Code:

K0708430-002

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	3.13		
Zinc	200.8	21.7	1.74	20.0	10/02/07	10/04/07	298		

% Solids:

Metals

-1-INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-3

Lab Code:

K0708430-003

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	1.91		
Zinc	200.8	21.5	1.72	20.0	10/02/07	10/04/07	227		

% Solids:

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix: WATER

Units: ug/L

Basis: N/A

K0708430-004

Sample Name: SKS-4 Lab Code:

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	0.89		
Zinc	200.8	1.06	0.09	1.0	10/02/07	10/04/07	107		

% Solids: 0.

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received:

9/18/07

Matrix:

WATER

ug/L Units:

N/A Basis:

Sample Name:

SKS-5

Lab Code:

K0708430-005

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.94		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	232		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix: WATER

Units: ug/L

Basis: N/A

Sample Name: SKS-6 Lab Code: K0708430-006

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	0.94		
Zinc	200.8	1.08	0.09	1.0	10/02/07	10/04/07	130		

% Solids: 0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-7

0.0

Lab Code:

K0708430-007

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.06	1.0	10/02/07	10/04/07	1.54		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	135		

% Solids:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

C1.00702.11

Date Received: 9/18/07

Matrix:

WATER

Units: ug/L

Basis: N/A

Sample Name:

SKS-8

Lab Code:

K0708430-008

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.63		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	132		

% Solids:

0.0

Metals

-1-

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix: WATER

Units: ug/L

Basis: N/A

Sample Name: Method Blank Lab Code: K0708430-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.10	0.03	1.0	10/02/07	10/04/07	0.03	U	
Zinc	200.8	0.50	0.04	1.0	10/02/07	10/04/07	0.04	U	

% Solids: 0.0

Metals

- 3 -

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

	Initial Calib. Blank			Con	tinuing Cal Blank (ug/		tion		
Analyte	(ug/L)	С	1	С	2	С	3	С	Method
Copper	0.30	U	0.30	U	0.30	U	0.30	U	200.8
Zinc	0.4	U	0.4	U	0.4	U	0.4	U	200.8

Metals

- 3 -

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

	Initial Calib. Blank			Cont	tinuing Cal Blank (ug/		tion		
Analyte	(ug/L)	C	1	С	2	С	3	С	Method
Copper			0.30	U	0.30	U	0.30	U	200.8
Zinc			0.4	U	0.4	U	0.4	U	200.8

Metals

-3-

BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.:

SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

	Initial Calib. Blank			Cont	tinuing Cal Blank (ug/		tion		
Analyte	(ug/L)	С	1	С	2	С	3	С	Method
Copper			0.39	В	0.30	υ			200.8
Zinc			1.1	В	0.4	U			200.8

Metals

- 6 -

DUPLICATES

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Units: UG/L

Project Name: Starkist Effluent Monitoring

Basis: N/A

Matrix:

WATER

% Solids:

0.0

Sample Na	me: DLCSW	K0708475		Lab Code: I	CSWI)		
Analyte	Control Limit	Sample (S)	С	Duplicate (D)	С	RPD	Q	Method
Copper		1.98		1.97		0.5		200.8
Zinc		2.10		2.36		11.7		200.8

Metals

- 10 -

DETECTION LIMITS

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: K-ICP-MS-03

GFAA ID #:

AA ID #:

Analyte	Isotope	Back- ground	MRL ug/L	MDL ug/L	м
Copper	65		1.00	0.3	MS
Zinc	66		5.0	0.4	MS

Comments:	
	0033

Analytical Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0702.TW

Sample Matrix:

Water

Service Request: K0708430 Date Collected: 09/05/07

Date Received: 09/18/07

Mercury, Total

Prep Method:

METHOD

Test Notes:

Units: ng/L Analysis Method: 1631E Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0708430-001	5.0	0.25	5	09/18/07	09/26/07	61.4	
SKS-2	K0708430-002	1.0	0.05	1	09/18/07	09/26/07	16.8	
SKS-3	K0708430-003	1.0	0.05	1	09/18/07	09/26/07	15.2	
SKS-4	K0708430-004	1.0	0.05	l	09/18/07	09/26/07	49.0	
SKS-5	K0708430-005	1.0	0.05	1	09/18/07	09/26/07	63.0	
SKS-6	K0708430-006	1.0	0.05	1	09/18/07	09/26/07	50.2	
SKS-7	K0708430-007	1.0	0.05	1	09/18/07	09/26/07	86.6	
SKS-8	K0708430-008	1.0	0.05	1	09/18/07	09/26/07	122	
Method Blank 1	K0708430-MB1	1.0	0.05	1	09/17/07	09/26/07	0.3	В
Method Blank 2	K0708430-MB2	1.0	0.05	1	09/17/07	09/26/07	ND	
Method Blank 3	K0708430-MB3	1.0	0.05	1	09/17/07	09/26/07	ND	

QA/QC Report

Client: Glatzel da Costa, gdc

Project: Starkist Effluent Monitoring/SKS0702.TW

Sample Matrix: Water

Service Request: K0708430 Date Collected: 09/05/07 Date Received: 09/18/07

Date Extracted: 09/18/07 Date Analyzed: 09/26/07

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name: Lab Code: SKS-4

K0708430-004S,

K0708430-004SD

Units: ng/L

Basis: NA

Test Notes:

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL	•		Sample Result	Spike MS	Result DMS	MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	1.0	25	25	49.0	67.7	71.2	75	89	71-125	5	

QA/QC Report

Client: Project: Glatzel da Costa, gdc

Starkist Effluent Monitoring/SKS0702.TW

Service Request: K0708430 Date Collected: NA

LCS Matrix:

Water

Date Received: NA

Date Extracted: 09/18/07 Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Acceptance Result Prep Analysis True Percent Notes Limits Analyte Method Method Value Result Recovery METHOD 1631E 5.00 4.60 92 77-123 Mercury

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0708430

Project:

Starkist Effluent Monitoring/SKS0702.TW

Date Collected: NA

LCS Matrix:

Date Received: NA

Water

Date Extracted: 09/18/07

Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.46	89	77-123	

QA/QC Report

Client: Service Request: K0708430 Glatzel da Costa, gdc Project: Starkist Effluent Monitoring/SKS0702.TW Date Collected: NA LCS Matrix: Water

Date Received: NA Date Extracted: 09/18/07 Date Analyzed: 09/26/07

Quality Control Sample (QCS) Summary

Total Metals

Sample Name: Quality Control Sample Units: ng/L

Basis: NA

Test Notes:

CAS Percent Recovery Result Prep **Analysis** True Percent Acceptance Analyte Method Method Value Result Recovery Limits Notes 77-123 Mercury METHOD 1631E 5.00 4.34 87

EFFLUENT METALS TESTING — STARKIST SAMOA FEBRUARY 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa

Karen Glatzel

gdc, P.O. Box 1238, Trinidad, CA 95570 707-677-0123 – gdcocn@earthlink.net

Date: 27 July 2007

Distribution: Carl Goldstein

United States Environmental Protection Agency, Region 9

Peter Peshut

American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 non-tradewind season was done using eight (8) samples collected every three hours on February 27th and 28th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		2.2		3.9

Copper was below the American Samoa Water Quality Standards criterion for all samples. Mercury exceeded the ASWQS criterion for 7 of the eight samples and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In February 2007 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted ZOM for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 27 February and 06:00 on 28 February 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Tab	ole 1. Results	of Effluent Me	tals Testing	
Time	Flow (mg/d)	Hg (μg/l)	Cu (μg/l)	Zn (μg/l)
27 Feb 2007 - 09:00	2.20	0.0550	1.56	169
27 Feb 2007 - 12:00	2.02	0.0586	2.31	296
27 Feb 2007 - 15:00	2.06	0.0676	2.02	178
27 Feb 2007 - 18:00	2.50	0.0501	1.43	142
27 Feb 2007 - 21:00	2.48	0.0704	2.16	196
28 Feb 2007 - 00:00	1.76	0.0427	1.81	166
28 Feb 2007 - 03:00	2.16	0.0825	2.98	222
28 Feb 2007 - 06:00	2.15	0.0810	2.13	159
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Standard Deviation	0.242	0.0143	0.48	48.9

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS February 2007 samples (0.0635 μ g/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 μ g/l) and less than to the averages of supplemental mercury testing conducted in previous analyses ssummarized in the next section.
- There was little variability among the results from individual grab samples (standard deviation = $0.014 \,\mu\text{g/l}$) as shown in Table 1.
- Seven of the eight of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 μg/l. The current NPDES Permit does <u>not</u> have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS February 2007 samples was 2.05 μ g/l (Table 1). The average concentrations reported for this sampling period are less than those reported for previous analyses as described in the next section.
- There was little variability among the copper results from the eight individual grab samples with a standard deviation of $0.48 \,\mu\text{g/l}$.

³ Conducted in September 2004.

- All of the samples had copper concentrations below the ASWQS criterion⁴ of 3.1 μg/l. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 μg/l, and daily maximum of 108 μg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

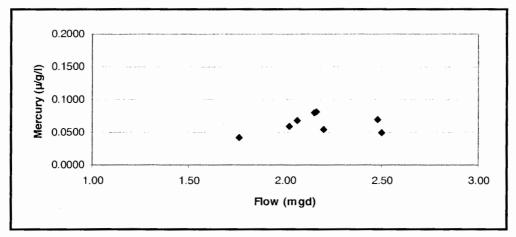


Figure 1. SKS effluent flow rate and mercury concentration (Feb 2007)

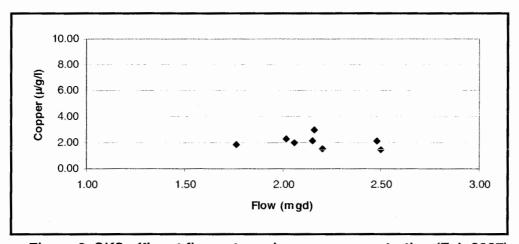


Figure 2. SKS effluent flow rate and copper concentration (Feb 2007)

The results of the sample testing for zinc indicate:

• The average zinc concentration for the SKS February 2007 samples was 191 μ g/l (Table 1). This concentration is less than the average values for previous analyses described in the next section.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 48.9) with a range between 142 μ g/l and 296 μ g/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 μ g/l. All values are well below the current NPDES Permit limitation (1545 μ g/l monthly average and 1770 μ g/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

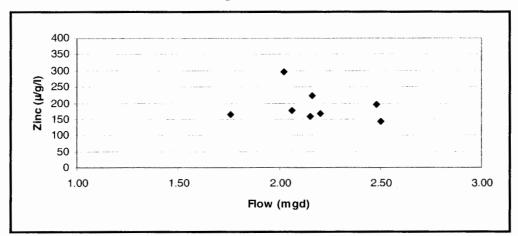


Figure 3. SKS effluent flow rate and zinc concentration (Feb 2007)

Comparison to Previous Tests

A summary of the semi annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution. The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

 D_R = is the dilution required to reduce the concentration to the ASWQS

 C_E = the effluent concentration

 C_A = the maximum receiving water concentration

 C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

					s Testing R SWQS Crite			
Parame			cury		pper		inc	
Water Quality	Criterion		i μ g/l	3.1 μg/l		81 μg/l		
Ambient Ma			32 μ g/l		3 μg/l		μ g/l	
Sample	Flow	Conc.	Dilution	Conc. Dilution		Conc.	Dilution	
Date	(mgd)	(μg/l)	Required	(μ g/l)	Required	(μg/l)	Required	
	2.44	0.0734	1.87					
	3.05	0.109	3.20					
	3.02	0.101	2.90					
Aug 2005	2.39	0.122	3.69					
Aug 2005	2.55	0.177	5.74					
	2.8	0.153	4.84					
	2.03	0.112	3.31					
	2.14	0.0912	2.54					
	1.98	0.107	3.13	3.63	1.23	264	3.27	
	2.63	0.083	2.23	2.82		196	2.43	
	2.6	0.298	10.25	2.17		146	1.81	
Feb 2006	1.94	0.088	2.42	3.61	1.22	226	2.80	
Feb 2000	1.95	0.096	2.72	3.67	1.25	340	4.22	
	2.16	0.092	2.57	2.44		267	3.31	
	2.53	0.102	2.94	1.79		190	2.35	
	2.15	0.145	4.54	4.83	1.76	266	3.30	
	2.03	0.0802	2.13	2.92		200	2.48	
	2.12	0.0820	2.19	3.93	1.37	272	3.37	
	2.22	0.150	4.73	4.32	1.54	368	4.57	
Nov 2006	2.76	0.140	4.36	3.3	1.09	322	4.00	
1100 2000	2.59	0.106	3.09	3.14	1.02	329	4.08	
	2.40	0.104	3.01	2.79		246	3.05	
	2.41	0.158	5.03	3.35	1.11	278	3.45	
	2.60	0.115	3.43	2.28		195	2.42	
	2.20	0.0550	1.19	1.56		169	2.09	
	2.02	0.0586	1.32	2.31		296	3.67	
	2.06	0.0676	1.66	2.02		178	2.21	
Feb 2007	2.50	0.0501	1.00	1.43		142	1.76	
Feb 2007	2.48	0.0704	1.76	2.16		196	2.43	
	1.76	0.0427		1.81		166	2.06	
	2.16	0.0825	2.21	2.98		222	2.75	
	2.15	0.0810	2.16	2.13		159	1.97	
Minimum	1.76	0.04	1.00	1.43	1.02	142.00	1.76	
Average	2.34	0.11	3.17	2.81	1.29	234.71	2.91	
Maximum	3.05	0.30	10.25	4.83	1.76	368.00	4.57	

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:16. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I Chain-of-Custody

	The state of the s	STATE OF THE PARTY	
Process and Track your shipment online: http://dx.	o://www.dhl.com	DESTINATION CODE	1
EXPRESS 1-800-CALL-DHL in USA only	800 3355 813 PD	LIC L	. +
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	r Card	Not all products or service options are evaluable bottom all logations.	
Not all purpose options are as	ailable	International Express Envelope One of the control	
2 From (Shipper)		Non-Dutlable	
Shipper's Account Number Contact Name		Service Options (extra charges may apply)	
918902636 JOE CARNEY	4 Shipment Details	Saturday Special Pickup	
Shipper's Reference (up to 35 characters) NDS - KW-G-DC	Total number Total Weight Dimensions (in inches) Total Pieces Total Weight Pieces Total Weight To	Delivery Notification Signature Required	le E
	packaging used, enter XD@ x x	Other	
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		Other	
PILOU INOU	5 Full Description of Contents Give Content and Quantity	DIMENSIONAL/CHARGEABLE WEIGHT	<u>.</u>
AMERICAN SAMOA	WATER GUNLINY SAMPLES FUR LARURATURY ANALYSIS	lbs C	DHE THE
		SERVICES CHARGES	EXPR
PosyZiP Code (required) Phone, Fax, or E-mail (required) Phone, Fax, or E-mail (required) Phone, Fax, or E-mail (required)	NO COMMESCIAL VALUE	SERVICES CHARGES	ABOC
AND THE PROPERTY OF THE PROPER			
3 To (Receiver) Company Name	6 Dutiable Shipments Only (Customs requirement) Attach the original and four copies of a Proforms or Commercial Invoice.	Tors	S (11)
COLUMBIA AHALYTICALSLEVI	Export License No./Symbol (If applicable) Receiver's VAT/GST or Shipper's EIN/SSN	ğ	05)
Contact Person	Declared Value for Customs (in US \$) Schedule B Number / Harmonized Code (if applicable)	Drop Box # TOTAL .	
HARVEY JACKY Delivery Address DHL Cannot Deliver to a PO Box 1317 SOUTH 13TH AVE	(as on commarcial/proforms invoice)	TRANSPORT COLLECT STICKER No.	
Delivery Address DHL Cannot Deliver to a PO Box	AES TRANSACTION NUMBER TYPE OF EXPORT		
131+ SOUTH 13 HOE	Permanent Repair/Return Temporary Destination Duties/Taxes If left blank, Receiver pays duties/taxes.	PAYMENT DETAILS (Check, Card No.)	
KELSO WA	Receiver Shipper Other	No.:	สามห
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Country	7 Shipper's Authorization (signature required)	Auth.	
Country	I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may file apply (see leverse). I/we authorize DHL to complete other documents because it expends a shipment. Whe understand that Shipment was shipment. Whe understand that Shipment as Value Protection is available on redest, for as a registrate, i.we agree to pay all charges if the recipient of 3rd party refuses To pay, law pays lambages. ILD CS NOT TRANSPORT CASH.	PICKED UP BY	
Post/ZiP Code (required) Phone, Fax, or E-mail (required) 3 60-577-72	Value Protection is available or recess, for an artiful charge, live agree to pay all charges if the recipient or 3rd party refuses to pay, live unperstand that the DOES NOT TRANSPORT CASH.	Route No.	2
98626 360-577-72	Signature (required)	Time 1017 Date 2111	

CHAIN OF CUSTODY

PROJECT:	StarKist Efflu	ent Mor	itoring - Sł	(S0701.NT									
FROM:	Karen Glatze	l, gdc	*										
	P.O. Box 123	38, Trinic	dad, CA, 9	5570-1238				707-677-012	3	gdcoc	n@ea	athlink.	net
TO:	Harvey Jack	y, Colum	nbia Analyti	ical Services									
	1317 South							360-577-722	2				
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF									
				CONTAINERS	Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a		Zn	Hg	
SKS-1	2/28/2007		Water	2						X	X	Х	
SKS-2	2/28/2007		Water	2						Х	X	X]
SKS-3	2/28/2007		Water	2						X	X	X]
SKS-4	2/28/2007		Water	2						X	X	X	Total metals
SKS-5	2/28/2007		Water	2						X	X	Х	, otal motale
SKS-6	2/28/2007		Water	2						X	X	X	
SKS-7	2/28/2007		Water	2						X	X	Х	1
SKS-8	2/28/2007		Water	2						X	X	Х	
					2								
		44											
SAMPLED BY		BAG		DATE/TIME:		2007	-4	NSTRUCTIONS					
SHIPPED VIA				DATE/TIME:		2007		ple may be as r		eawate	r		
RELINQUISH		sta S	NC	DATE/TIME:	3/1/2	2007	Report Dup	p, MS, MSD as	required				
RECEIVED B				DATE/TIME:			4						
RELINQUISH				DATE/TIME:			4						
RECEIVED B	Υ:			DATE/TIME:									

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

Sample Matrix:

Service Request No.:

K0701734

Date Received:

3/5/07

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/5/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by	#	Date	3/2	0/07	
	-//		7	/	

Acronyms

ASTM American Society for Testing and Materials

A2LA American Association for Laboratory Accreditation

CARB California Air Resources Board

CAS Number Chemical Abstract Service registry Number

CFC Chlorofluorocarbon
CFU Colony-Forming Unit

DEC Department of Environmental Conservation

DEQ Department of Environmental Quality

DHS Department of Health Services

DOE Department of Ecology
DOH Department of Health

EPA U. S. Environmental Protection Agency

ELAP Environmental Laboratory Accreditation Program

GC Gas Chromatography

GC/MS Gas Chromatography/Mass Spectrometry

LUFT Leaking Underground Fuel Tank

M Modified

MCL Maximum Contaminant Level is the highest permissible concentration of a

substance allowed in drinking water as established by the USEPA.

MDL Method Detection Limit
MPN Most Probable Number
MRL Method Reporting Limit

NA Not Applicable
NC Not Calculated

NCASI National Council of the Paper Industry for Air and Stream Improvement

ND Not Detected

NIOSH National Institute for Occupational Safety and Health

PQL Practical Quantitation Limit

RCRA Resource Conservation and Recovery Act

SIM Selected Ion Monitoring

TPH Total Petroleum Hydrocarbons

tr Trace level is the concentration of an analyte that is less than the PQL but greater

than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Analytical Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

Sample Matrix:

Water

Service Request: K0701734

Date Collected: 2/28/07

Date Received: 3/5/07

Mercury, Total

Prep Method:

METHOD

Analysis Method: 1631E

Test Notes:

Units: ng/L Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0701734-001	1.0	0.05	1	3/5/07	3/12/07	55.0	
SKS-2	K0701734-002	1.0	0.05	1	3/5/07	3/12/07	58.6	
SKS-3	K0701734-003	1.0	0.05	1	3/5/07	3/12/07	67.6	
SKS-4	K0701734-004	1.0	0.05	1	3/5/07	3/12/07	50.1	
SKS-5	K0701734-005	1.0	0.05	1	3/5/07	3/12/07	70.4	
SKS-6	K0701734-006	1.0	0.05	1	3/5/07	3/12/07	42.7	
SKS-7	K0701734-007	1.0	0.05	1	3/5/07	3/12/07	82.5	
SKS-8	K0701734-008	1.0	0.05	1	3/5/07	3/12/07	81.0	
Method Blank	K0701734-MB1	1.0	0.05	1	3/5/07	3/12/07	0.2	В
Method Blank	K0701734-MB2	1.0	0.05	1	3/5/07	3/12/07	0.07	В
Method Blank	K0701734-MB3	1.0	0.05	1	3/5/07	3/12/07	0.1	В

QA/QC Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

Sample Matrix:

Water

Service Request: K0701734

Date Collected: 2/28/07 Date Received: 3/5/07

Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Matrix Spike/Duplicate Matrix Spike Summary

Total Metals

Sample Name:

SKS-1

Lab Code: Test Notes: K0701734-001MS,

K0701734-001MSD

Units: ng/L

Basis: NA

Percent Recovery

Analyte	Prep Method	Analysis Method	MRL			Sample Result	Spike MS			DMS	CAS Acceptance Limits	Relative	Result Notes
Mercury	METHOD	1631E	1.0	25	25	55.0	81.8	83.3	107	113	71-125	2	

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project:

LCS Matrix:

Starkist Effluent Monitoring/SKS0701.NT Water

Date Collected: NA

Date Received: NA
Date Extracted: 3/5/07

Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.44	109	77-123	

QA/QC Report

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project:

Starkist Effluent Monitoring/SKS0701.NT

Date Collected: NA

LCS Matrix:

Water

Date Received: NA
Date Extracted: 3/5/07

Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name:

Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

QA/QC Report

Client:

Glatzel da Costa, gdc

Project:

Starkist Effluent Monitoring/SKS0701.NT

LCS Matrix:

Water

Service Request: K0701734

Date Collected: NA Date Received: NA

Date Extracted: 3/5/07

Date Analyzed: 3/12/07

Quality Control Sample (QCS) Summary

Total Metals

Sample Name:

Quality Control Sample

Units: ng/L

Basis: NA

Test Notes:

CAS

Percent

Recovery Acceptance

Result

Analyte

Prep Method Analysis True Method Value

Result Recovery Limits

Notes

Mercury

METHOD

1631E

5.00 5.32

106

Percent

77-123

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: μG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0701734-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	1.56		
Zinc	200.8	1.04	0.10	1	3/13/07	3/15/07	169		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0701734-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	2.31		
Zinc	200.8	10.80	1.08	10	3/13/07	3/15/07	296		

% Solids:

0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units:

μG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0701734-003

Analyte	Analysis Method	MRL	WDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.02		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	178		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0701734-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	1.43		
Zinc	200.8	1.08	0.11	1	3/13/07	3/15/07	142		

% Solids:

0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0701734-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Ω
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	2.16		
Zinc	200.8	10.20	1.02	10	3/13/07	3/15/07	196		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0701734-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	1.81		
Zinc	200.8	1.02	0.10	1	3/13/07	3/15/07	166		

% Solids:

0.0

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0701734-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.98		
Zinc	200.8	10.50	1.05	10	3/13/07	3/15/07	222		

% Solids: 0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected: 02/28/07

Project Name:

Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0701734-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.13		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	159		

% Solids:

0.0

-1-

INORGANIC ANALYSIS DATA SHEET

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix:

WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0701734-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	С	Q
Copper	200.8	0.10	0.01	1	3/13/07	3/15/07	0.01	ט	
Zinc	200.8	0.50	0.05	1	3/13/07	3/15/07	0.05	ט	

% Solids: 0.0

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source: Inorganic Ventures

CCV Source: Various

	Initial	Calibratio	on		Continui	ng Calib	ration		
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper	12.5	12.7	102	25.0	25.5	102	23.3	93	200.8
Zinc	25.0	25.8	103	25.0	25.5	102	23.3	93	200.8

METALS

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

	Initial	Calibrat	ion		Continui				
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	24.2	97	24.9	100	200.8
Zinc				25.0	24.6	98	25.0	100	200.8

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

	Initia	Calibrat	ion		Continui				
Analyte	True	Found	%R (1)	True	Found	%R(1)	Found	%R(1)	Method
Copper				25.0	25.1	100			200.8
Zinc				25.0	25.5	102			200.8

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

	CRDL sta	andard for AA			Init	CRDL Standar ial	d for I	CP Final		
Analyte	True	Found	%R	True Found &R Found						
Copper				Ш	1.0	1.08	108			
Zinc			1	H	5.0	5.05	101			

METALS - 3 -BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name:

Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)				ing Cali nk (ug/L		ation	Preparation Blank	Method
Analyte	(-3,-,	С	1	С	2	С	3 C	С	
Copper	0.10	U	0.10	U	0.10	IJ	0.10 U		200.8
Zinc	0.50	Ū	0.50	U	0.50	IJ	0.50 บ		200.8

METALS - 3 -BLANKS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name:

Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water):

WATER

Preparation Blank Concentration Units (ug/L or mg/kg):

UG/L

	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)					Preparation Blank	Method	
Analyte	(dg/L)	· C	1	С	2	С	3	С	С	
Copper			0.10	טו	0.10	U		T		200.8
Zinc			0.50	ט וכ	0.50	υ		T		200.8

METALS

-7-

LABORATORY CONTROL SAMPLE

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source:

Inorganic Ventures

Solid LCS Source:

	Aqueou	ıs ug/L	Solid (mg/kg)					
Analyte	True	Found	%R	True	Found	С	Limits	%R
Copper	2.00	1.98	99			1		
Zinc	2.00	2.02	101					

METALS

-7-

LABORATORY CONTROL SAMPLE

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source:

Inorganic Ventures

Solid LCS Source:

	Aqueous ug/L			Solid (mg/kg)				
Analyte	True	Found	%R	True	Found	С	Limits	%R
Copper	2.0	0 1.94	97				-	
Zinc	2.0	0 1.95	98					

-10-

METHOD DETECTION LIMITS

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back- ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.00	0.10	200.8
Zinc	66		5.00	0.50	200.8

Comments:	

-12-

ICP LINEAR RANGES (QUARTERLY)

Client:

Glatzel da Costa, gdc

Service Request: K0701734

Project No.:

SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP ID Number:

Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method	
Copper	15.00	1000.0	200.8	
Zinc	15.00	1000.0	200.8	